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# INDEX

Volume II, June-December, 1920

- (E) indicates an editorial  
(N) indicates a signed news item or communication  
(R) indicates a book review

- Alexander, Carter and Theisen, W. W., Publicity Campaigns for Better School Support, 457; School Statistics and Publicity (R) (A. G. Capps).
- Anderson, H. W. and others, Survey of Public School Building Requirements in Cleveland Heights, Ohio (R) (N. L. Engelhardt), 857
- Arithmetic, Results of Three Types of Drill on the Fundamentals of, F. J. Kelly, 693
- Averages (E), B. R. Buckingham, 766
- Ayres' Formula (E), B. R. Buckingham, 505
- Ayres, Leonard P., Correlation Ratio, 452; Leaves the Russell Sage Foundation to Enter the Cleveland Trust Company, 870; Substituting Small Numbers for Large Ones in the Computation of Coefficients of Correlation, 502
- Bad Situation Made Intolerable (E), B. R. Buckingham, 582
- Baker, H. J., A Short Method of Determining Probable Error (N), 592
- Barthelmess, Harriet M., Geography Testing in Boston, 701
- Batteries of Tests for School Surveys, 514
- Betelle, James, A Checking Schedule for Projected School Buildings (R) (N. L. Engelhardt), 858
- Bexell, T. A., First Lessons in Business (R) (Ira S. Griffith), 674
- Branom, Mendel E., Project Method in Education (R) (James H. Green), 769
- Briggs, Thomas H., Comparative Results in Intermediate and Elementary Schools at Los Angeles, 681; The Junior High School (R) (Charles E. Chadsey), 673
- Bright Boy (N), R. L. Morton, 865
- Brightness and Dullness in Children, Herbert Woodrow (R), 589
- Brooks, Samuel S., Getting Teachers to Feel the Need for Standardized Tests, 425; Using Standardized Tests in Rural Schools for Grading Purposes, 729
- Brown, H. A., Formulation of Method in Reading, 436; Study of Ability in Latin in Secondary Schools (R) (B. R. Buckingham), 508
- Brueckner, L. J. and others, Survey of Public School Building Requirements in Cleveland Heights, Ohio (R) (N. L. Engelhardt), 857
- Buckingham, B. R., Averages (E), 766; Ayres' Formula (E), 505; Bad Situation Made Intolerable (E), 582; Brightness and Dullness in Children (Herbert Woodrow) (R), 589; College Teaching (Paul Klapper) (R), 587; Concerning Educational Policy (E), 668; Next Step after Testing (E), 855; Journal of Educational Research: Crumbs of Comfort (E), 763; Our Contributors (E), 854; Research in Textbook Publishing (E), 670; Suggestions for Procedure following a Testing Program: *I. Re-classification*, 787
- Buckingham, B. R. and Monroe, Walter S., A Testing Program for Elementary Schools, 521

- Building Requirements, Survey of in Cleveland Heights, Ohio, P. C. Packer and others (R), 857
- Bureau of Educational Research, Aberdeen, South Dakota, 595
- Cameron, Edward H., Health through Will Power (James J. Walsh) (R), 511; Mental Hygiene of Childhood (William A. White) (R), 510
- Camp, F. S., Wanted: A History Scale Maker (N), 517
- Campaign Method in Elementary Education, J. W. Richardson, 481
- Capps, A. G., Curriculum Content of a High School Spelling Course, 626; School Statistics and Publicity (Carter Alexander) (R), 859
- Chadsey, Charles E., Junior High School (Thomas H. Briggs) (R), 673; School Administration and School Reports (Paul H. Hanus) (R), 674
- Chapman, J. Crosby, A Group Intelligence Examination without Prepared Blanks, 777
- Chapman, J. Crosby and H. L. Eby, A Comparative Study, by Educational Measurements, of One-Room Rural School Children and City-School Children, 636
- Checking Schedule for Projected School Buildings, James Betelle (R), 858
- Childhood, Mental Hygiene of, William A. White (R), 510
- Class Efficiency, Size of Class and, 772
- Classification of School Children according to Mental Age, Rudolf Pintner and Helen Noble, 713
- College Teaching, Paul Klapper (R), 587
- Colorado, Common School Finance in and Certain Inferences of National Import, F. H. Swift, 647, 741
- Common School Finance in Colorado and Certain Inferences of National Import, F. H. Swift, 647, 741
- Comparative Results in Intermediate and Elementary Schools at Los Angeles, T. H. Briggs, 681
- Comparative Study by Educational Measurements of One-Room Rural-School Children and City-School Children, J. Crosby Chapman and H. L. Eby, 636
- Comparison of Diagnostic Arithmetic Tests, 676
- Concerning Educational Policy (E), B. R. Buckingham, 668
- Correlation: Ayres' Formula (E), B. R. Buckingham, 505; Coefficient of, Effect of Grade Distribution upon (N), W. S. Monroe, 776; Substituting Small Numbers for Large Ones in the Computation of Coefficients of Correlation, L. P. Ayres, 502; Ratio, L. P. Ayres, 452
- Courtis Supervisory Test in Geography, Scores of a Group of Rural Teachers on (N), Fred D. Cram, 515
- Cram, Fred D., Scores of a Group of Rural Teachers on Courtis Standard Supervisory Test in Geography (N), 515
- Credit, Weighted, W. H. Hughes, 547
- Curriculum Content of a High School Spelling Course, A. G. Capps, 626
- Daley, H. C., Intelligence of Intermediate and High-School Pupils (N), 676
- Dawson, Charles D., Educational Measurement in Grand Rapids, 611
- Dearborn Group Tests of Intelligence, 675
- Dickson, Virgil E., Use of Group Mental Tests in the Guidance of Eighth-Grade and High-School Pupils, 601; What First-Grade

- Children Can Do in School as Related to What is Shown by Mental Tests, 475
- Directors of Supervised Student Teaching, 513
- Eby, H. L. and Chapman, J. Crosby, A Comparative Study, by Educational Measurements, of One-Room Rural-School Children and City-School Children, 636
- Educational Guidance, Use of Group Mental Tests in the Guidance of Eighth-Grade and High-School Pupils, V. E. Dickson, 601
- Educational Measurements: Cyrus D. Mead, 557; in the Field of History, Chas. L. Harlan, 849; in Grand Rapids, Charles D. Dawson, 611; in a Small School System, Frank H. Koos, 493; University, College and Normal School Courses in (N), C. W. Odell, 772
- Educational Measurements. *See also* Tests.
- Educational Research in Cities of over Ten Thousand, 596
- Effect of Grade Distribution upon Coefficient of Correlation (N), W. S. Monroe, 776
- Elementary Schools: Campaign Method in, J. W. Richardson, 481; Comparative Results in Intermediate and Elementary Schools, Thomas H. Briggs, 681; Testing Program for, B. R. Buckingham and Walter S. Monroe, 521
- Elson, J. C. and Trilling, Blanche M., Social Games and Group Dances (R) (Louise Freer), 860
- Employment Psychology, Henry C. Link (R), 769
- Engelhardt, N. L., A Checking Schedule for Projected School Buildings (J. O. Betelle) (R), 858; Survey of Public School Building Requirements in Cleveland Heights, Ohio (P. C. Packer and others) (R), 857
- Finance, School, in Colorado and Certain Inferences of National Import, F. H. Swift, 647, 741
- First-Grade Children, What They Can Do in School as Related to What is Shown by Mental Tests, V. E. Dickson, 475
- First Lessons in Business, T. A. Bexell, 674
- Formulation of Method in Reading, H. A. Brown, 436
- Freer, Louise, Social Games and Group Dances (Blanche M. Trilling and J. C. Elson) (R), 860
- Geography Testing in Boston, Harriet M. Barthelmess, 701
- Getting Teachers to Feel the Need for Standardized Tests, S. S. Brooks, 425
- Gosling, Thomas W., Split-Unit Program in High Schools, 736
- Grade, Distributions, Effect of upon Coefficient of Correlation (N), W. S. Monroe, 776; Norms for the New York City Penmanship Scale, Eugene A. Nifenecker, 808
- Graves, Frank P., The Maria Hosmer Penniman Memorial Library of Education (R), 674
- Green, James H., Project Method in Education (Mendel E. Branom) (R), 769
- Griffith, Ira S., Employment Psychology (Henry C. Link) (R), 769; First Lessons in Business (T. A. Bexell) (R), 674
- Grouping by Standardized Tests for Instructional Purposes, Sarah P. Ketner, 620
- Group Intelligence Examination without Prepared Blanks, J. Crosby Chapman, 777
- Handwriting Scale, Grade Norms for the New York City, E. A. Nifenecker, 808

- Hanus, Paul H., *School Administration and School Reports* (R) (Charles E. Chadsey), 674
- Harlan, Chas. L., *Educational Measurement in the Field of History*, 849
- Health through Will Power (R), James J. Walsh, 511
- Henmon, V. A. C., *Sixth Conference on Educational Measurements* (R) 509
- History, *Educational Measurement in*, Chas. L. Harlan, 849; *Scale Maker Wanted* (N), F. S. Camp, 517
- Horn, Ernest, *Selection of Silent Reading Textbooks*, 615
- Hughes, W. H., *Standardizing Procedure in Combination System of Supervised Study, Varying Scope of Work, and Weighted Credit*, 547
- Idaho Bureau at Lewiston, 513
- Illinois Examination, B. R. Buckingham and Walter S. Monroe, 521
- Improvement in Schools throughout the School Year (N), Katherine Murdock, 863
- Individual Differences in Reading, Provisions for, W. W. Theisen, 560
- Intelligence Examination without Prepared Blanks, J. Crosby Chapman, 777
- Intelligence of Intermediate and High-School Pupils (N), H. C. Daley, 676
- Intelligence Tests. *See* Tests
- Journal of Educational Research: Crumbs of Comfort, B. R. Buckingham (E), 763; *Educational Policy of* (E), B. R. Buckingham, 668; *Our Contributors* (E), B. R. Buckingham, 854
- Junior High School, Thomas H. Briggs (R), 673; *Comparative Results in Intermediate and Elementary Schools at Los Angeles*, Thomas H. Briggs, 681
- Kelly, F. J., *Results of Three Types of Drill on the Fundamentals of Arithmetic*, 693
- Kent, Raymond A., *What Should Teacher-Rating Schemes Seek to Measure*, 802
- Ketner, Sarah P., *Grouping by Standardized Tests for Instructional Purposes*, 620
- Klapper, Paul, *College Teaching* (R) (B. R. Buckingham), 587
- Koos, Frank H., *Educational Measurements in a Small School System*, 493
- Link, Henry C., *Employment Psychology* (R), (Ira S. Griffith), 769
- Loomis, A. K., *Some Correlations with the Otis Scale* (N), 594
- Maria Hosmer Penniman Memorial Library of Education, Frank P. Graves (R), 674
- Mead, Cyrus D., *Measurements in Fairy Tale*, 557
- Measure Your Mind, M. R. Trabue and F. P. Stockbridge (R), 589
- Measurements in Fairy Tale, C. D. Mead 557
- Measuring Primary Teaching, 675
- Mental Age, *Classification of School Children according to*, Rudolf Pintner and Helen Noble, 713
- Mental Hygiene of Childhood (R), William A. White, 510
- Mental Tests. *See* Tests
- Monroe, Walter S., *Effect of Grade Distribution upon Coefficient of Correlation*, 776; *Measure Your Mind* (M. R. Trabue and F. P. Stockbridge) (R), 589; *On Objectives in Reading* (E), 765; *Psychology of Musical Talent* (C. E. Seashore) (R), 512; *Some Correlations between Otis Scale and Rogers Mathematical Tests* (N), 774

- Monroe, Walter S. and Buckingham, B. R., Testing Program for Elementary Schools, 521
- Morton, R. L., A Bright Boy (N), 865
- Murdock, Katherine, Improvement in School Subjects throughout the School Year (N), 863
- Musical Talent, Psychology of (R), C. E. Seashore, 512
- National Association of Directors of Educational Research, 519, 598, 679, 871
- New York City Penmanship Scale, Grade Norms for, E. A. Nifenecker, 808
- Next Step after Testing (E), B. R. Buckingham, 855
- Nifenecker, Eugene A., Grade Norms for the New York City Penmanship Scale, 808
- Noble, Helen and Pintner, Rudolf, Classification of School Children according to Mental Age, 713
- No Fairy Tale: The Need for Standardized Tests (N), C. W. Stone, 868
- Odell, C. W., University, College and Normal School Courses in Educational Measurements (N), 772
- On Objectives in Reading (E), W. S. Monroe, 765
- Otis Group Intelligence Scale: Correlations between Rogers Mathematical Tests and (N), W. S. Monroe, 774; Correlations with (N), A. K. Loomis, 594; (N), H. C. Daley, 676
- Overlapping in the Content of Fifteen Second Readers, Clifford Woody, 465
- Packer, P. C. and others, Survey of Public School Building Requirements in Cleveland Heights, Ohio (R) (N. L. Engelhardt), 857
- Pennsylvania Educational Congress, 771
- Pintner, Rudolf, and Noble, Helen, Classification of School Children according to Mental Age, 713
- Pressey, Luella W., Scale of Attainment No. I.—An Examination of Achievement in the Second Grade, 572
- Probable Error, A Short Method of Determining (N), H. J. Baker, 592
- Proctor, W. M., Use of Psychological Tests in the Vocational Guidance of High-School Pupils, 533
- Project Method in Education (R), Mendel E. Branom, 769
- Projects, Score Card for Judging, 675
- Provisions for Individual Differences in the Teaching of Reading, W. W. Theisen, 560
- Psychology of Musical Talent (R), C. E. Seashore, 512
- Publicity Campaigns for Better School Support, Carter Alexander and W. W. Theisen, 457
- Pupils: Classification of School Children according to Mental Age, Rudolf Pintner and Helen Noble, 713; Intelligence of Intermediate and High-School Pupils (N), H. C. Daley, 676; Use of Group Mental Tests in the Guidance of Eighth-Grade and High-School Pupils, V. E. Dickson, 601; Use of Psychological Tests in the Vocational Guidance of High-School Pupils, W. M. Proctor, 533
- Readers, Overlapping in the Content of Fifteen Second Readers, Clifford Woody, 465
- Reading: Formulation of Method in, H. A. Brown, 436; Provisions for Individual Differences in the Teaching of Reading, W. W. Theisen, 560; On Objectives in (E), W. S. Monroe, 765; Text-

- books, Selection of Silent, Ernest Horn, 615
- Report Cards, W. H. Hughes, 547
- Research in Textbook Publishing (E), B. R. Buckingham, 670
- Results of Three Types of Drill on the Fundamentals of Arithmetic, F. J. Kelly, 693
- Richardson, J. W., Campaign Method in Elementary Education, 481
- Rogers Mathematical Tests, Some Correlations between Otis Scale and (N), W. S. Monroe, 774
- Rural Schools: Children and City-School Children, J. Crosby Chapman and H. L. Eby, 636; Study of, 860; Using Standardized Tests for Grading Purposes, Samuel S. Brooks, 729
- Scale of Attainment No. I.—An Examination of Achievement in the Second Grade, L. W. Pressey, 572
- School, Administration and School Reports (R), Paul H. Hanus, 674; Buildings, A Checking Schedule for (R), James Betelle, 858; Finance in Colorado and Certain Inferences of National Import, F. H. Swift, 647, 741; Statistics and Publicity (R), Carter Alexander, 859; Support, Publicity Campaigns for, Carter Alexander and W. W. Theisen, 457
- Score Card, for Judging Home Projects, 675; for Rating Teachers, Raymond A. Kent, 802
- Scores of a Group of Rural Teachers on Courtis Standard Supervisory Test in Geography (N), F. D. Cram, 515
- Seashore, Carl E., Psychology of Musical Talent (R) (W. S. Monroe), 512
- Selection of Silent Reading Textbooks, Ernest Horn, 615
- Short Method of Determining Probable Error (N), H. J. Baker, 592
- Sixth Conference on Educational Measurements (R) V. A. C. Henmon, 509
- Size of Class and School Efficiency, 772
- Social Games and Group Dances, J. C. Elson and Blanche M. Trilling (R), 860
- Society for the Experimental Study of Education, 863
- Some Correlations with the Otis Scale (N), A. K. Loomis, 594
- Some Correlations between Otis Scale and Rogers Mathematical Tests (N), W. S. Monroe, 774
- Some Results in Using Starch's Arithmetic Reasoning Test (N), C. D. Dawson, 677
- Southern California Research Association, 513
- South Dakota, Research Association, 675
- Spelling Course, Curriculum Content of a High-School, A. G. Capps, 626
- Split-Unit Program in High Schools, Thomas W. Gosling, 736
- Standardizing Procedure in a Combination System of Supervised Study, Varying Scope of Work, and Weighted Credit, W. H. Hughes, 547
- Starch's Arithmetic Reasoning Test, Some Results in Using (N), C. D. Dawson, 677
- Stockbridge, Frank P. and Trabue, M. R., Measure Your Mind (R) (W. S. Monroe), 589
- Stone, C. W., No Fairy Tale: The Need for Standardized Tests (N), 868
- Study, of Ability in Latin in Secondary Schools (R), H. A. Brown, 508; of Rural Schools, 860
- Substituting Small Numbers for Large Ones in the Computation of



Coefficients of Correlation, L. P. Ayres, 502

Suggestions for Procedure Following a Testing Program: *I. Reclassification*, B. R. Buckingham, 787

Superintendents' Conference, 771, 861

Supervised Study, W. H. Hughes, 547

Supervision of Testing in Ohio, 861

Survey of Public School Building Requirements in Cleveland Heights, Ohio, (R), P. C. Packer and others, 857

Surveys, Batteries of Tests for School, 514

Teachers, Getting the Teachers to Feel the Need for Standardized Tests, S. S. Brooks, 425; Rating of, Correlations with the Otis Scale (N), A. K. Loomis, 594; Rating Schemes, Raymond A. Kent, 802; Scores of a Group of Rural Teachers on the Curtis Supervisory Test in Geography (N), Fred D. Cram, 515; Shortage of (E), B. R. Buckingham, 582

Terman, L. M., What Tests Are For (E), 585

Testing, Next Step after (E), B. R. Buckingham, 855; Program for Elementary Schools, B. R. Buckingham and Walter S. Monroe, 521

Tests: Batteries of for School Surveys, 514; by the United States Bureau of Education, 771; Campaign Method in Elementary Education, J. W. Richardson, 481; Comparative Study of One-Room Rural-School Children and City-School Children, J. Crosby Chapman and H. L. Eby, 636; Comparison of Diagnostic Arithmetic Tests, 676; Classification of School Children according to Mental Age, Rudolf Pintner and Helen Noble, 713; Correlations between Otis

Scale and Rogers Mathematical Tests (N), W. S. Monroe, 774; Educational Measurement in History, Chas. L. Harlan, 849; Educational Measurement in Grand Rapids, Charles D. Dawson, 611; Educational Measurements in a Small School System, Frank H. Koos, 493; from the Illinois Bureau of Educational Research, 675; Geography Testing in Boston, Harriet M. Barthelmess, 701; Getting Teachers to Feel the Need for Standardized Tests, S. S. Brooks, 425; Grade Norms for New York City Penmanship Scale, 808; Group Intelligence Examination without Prepared Blanks, J. Crosby Chapman, 777; Grouping by Standardized Tests for Instructional Purposes, Sarah P. Ketner, 620; Illinois Examination, B. R. Buckingham and Walter S. Monroe, 521; Intelligence of Intermediate and High School Pupils (N), 676; Musical Talent, Psychology of (R), C. E. Seashore, 512; Results of Three Types of Drill on the Fundamentals of Arithmetic, F. J. Kelly, 693; Scale of Attainment No. I.—An Examination of Achievement in the Second Grade, L. W. Pressey, 572; Scores of a Group of Rural Teachers on Curtis Standard Supervisory Test in Geography (N), F. D. Cram, 515; Sixth Conference on Educational Measurements (R), V. A. C. Henmon, 509; Starch's Arithmetic Reasoning Test (N) C. D. Dawson, 677; Suggestions for Procedure Following a Testing Program — *I. Reclassification*, B. R. Buckingham, 787; Supervision of Testing in Ohio, 861; Use of Group Mental Tests in the Guidance of Eighth-Grade and High-School Pupils, V. E. Dickson, 601; Using Stand-

- ardized Tests in Rural Schools for Grading Purposes, S. S. Brooks, 729; What First-Grade Children Can Do in School as Related to What is Shown by Mental Tests, V. E. Dickson, 475; What Tests Are For (E), L. M. Terman, 585
- Textbook Publishing, Research in (E), B. R. Buckingham, 670; Selection of Silent Reading, Ernest Horn, 615
- Theisen, W. W. and Alexander, Carter, Publicity Campaigns for Better School Support, 457; Provisions for Individual Differences in the Teaching of Reading, 560
- Trabue, M. R. and Stockbridge, Frank P., Measure Your Mind (R) (W. S. Monroe), 589
- Trilling, Blanche M. and Elson, J. C., Social Games and Group Dances (R) (Louise Freer), 860
- University, College, and Normal School Courses in Educational Measurements (N), C. W. Odell, 772
- Use of Psychological Tests in the Vocational Guidance of High School Pupils, W. M. Proctor, 533
- Using Standardized Tests in Rural Schools for Grading Purposes, S. S. Brooks, 729
- Vocational Guidance of High-School Pupils, Use of Psychological Tests in, W. M. Proctor, 533
- Walsh, James J., Health through Will Power (R) (E. H. Cameron), 508
- Wanted: A History Scale Maker (N) F. S. Camp, 517
- What First-Grade Children Can Do in School as Related to What is Shown by Mental Tests, Virgil E. Dickson, 475
- What Should Teacher-Rating Schemes Seek to Measure, Raymond A. Kent, 802
- What Tests Are For (E), L. M. Terman, 585
- White, William A., Mental Hygiene of Childhood (R) (E. H. Cameron), 510
- Will Power, Health through (R), James J. Walsh, 511
- Wisconsin Association for Educational Research, 592
- Woodrow, Herbert, Brightness and Dullness in Children (R) (B. R. Buckingham), 589
- Woody, Clifford, Overlapping in the Content of Fifteen Second Readers, 465





# Journal of Educational Research

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NUMBER 1

## GETTING TEACHERS TO FEEL THE NEED FOR STANDARDIZED TESTS<sup>1</sup>

SAMUEL S. BROOKS

*Superintendent of Schools, Silver Lake, New Hampshire*

Having concluded that standardized tests would greatly help me under the conditions set forth in my first article, I next attacked the problem of securing the whole-hearted cooperation of my teachers in their use. The psychology of interest teaches us that a person's best efforts are called forth only when he feels a real need. So I set myself to arouse in my teachers an enthusiastic interest by bringing them to feel a real need for definite standards of accomplishment in school work. In order to make them feel this need deeply, something more than merely telling them of the tests and their uses was necessary. They must be made to realize the inadequacy of ordinary methods of measuring results of teaching.

Accordingly, I called a series of teachers' meetings on four consecutive Saturday afternoons. In a district more than twenty miles square it is not easy to get all the teachers together at one place. I succeeded, however, in persuading two automobile owners in each town to take the teachers to these four meetings at a price that would little more than pay for the gasoline consumed. Whether or not this scheme could be worked in other districts would depend, of course, on the character of the automobile owners and the success of the superintendent in convincing them that they ought to be willing to do it in an emergency and for the welfare of the schools.

At the first meeting I outlined briefly what I wanted to do and why, and then suggested that we try some practical experiments.

<sup>1</sup> This is the second article by Superintendent Brooks on the general topic "Putting Standardized Tests to Practical Use in Rural Schools."

## THE FIRST MEETING

The first experiment was intended to prove the inaccuracy of teachers' marks in general. A few days before I had selected the paper turned in by a sixth-grade pupil in a regular arithmetic test given by one of the teachers. This test contained the usual ten problems and was supposed to measure knowledge of percentage. A hektographed copy of the pupil's paper was given out to each of the 24 teachers. Then, without warning them of my purpose or of what the results were apt to be, I asked them to correct the paper and mark it on a percentage basis. When all had finished, the papers were collected and I at once tabulated the results on the blackboard with the result shown in Table I.

TABLE I. DISTRIBUTION OF RATINGS OF A SIXTH-GRADE  
ARITHMETIC PAPER

Ratings	Frequency
90-94	3
85-89	8
80-84	6
75-79	4
70-74	2
65-69	1

The effect was striking. Nearly everybody had caught the idea and the expressions on the various faces showed me that there was no need of rubbing it in by pointing out the moral. Aroused interest was evident as I passed the papers back with the suggestion that we analyze the methods of marking to discover the factors which produced such evident lack of agreement. We finally agreed on the following points:

1. Most had marked the pupil's response to a problem entirely wrong if the answer was wrong without regard to correctness of principle.
2. Some gave half credit if the principle was right and the answer wrong.
3. The majority marked answers entirely wrong if a decimal point was omitted or misplaced while some gave varying degrees of credit if the digits of the answer were correct and the decimal point misplaced or omitted.
4. A few had assigned weights to the various problems on the basis of their own judgments with far from uniform results. This factor actually seemed to have been the one which had produced the most extreme variations in the marking.

Then someone suggested that we try it again and see if we couldn't do better. Several others seconded the idea, so I passed around copies of an eighth-grade pupil's history paper. Never did teachers work more seriously than did those teachers for the next fifteen or twenty minutes. The papers were then collected and the marks tabulated as before with these results:

TABLE II. DISTRIBUTION OF RATINGS OF AN EIGHTH-GRADE HISTORY PAPER

Ratings	Frequency
90-94	1
85-89	3
80-84	10
75-79	5
70-74	2
65-69	3

Then followed a lively discussion, as a result of which the following important conclusions were unanimously agreed upon:

1. That teachers' marks are ordinarily very apt to be inaccurate.
2. That, due to the personal standards of the teacher and to individual marking systems, the work of the same child may be graded very high by one teacher and very low by another.
3. That such irresponsible rating may work serious injustice to the children.
4. That the work of different schools cannot be accurately compared under such conditions.

And best of all, these conclusions were mostly arrived at by the teachers themselves with the help of a few leading questions on my part. Was it worth while? Would those teachers ever again correct test papers with the same self-satisfied assurance of the infallible justice of their marks? Would they ever again feel fully justified in retarding a pupil because he is given a mark of 68 when the passing mark is 70?

It was now time to bring the meeting to a close. Several wanted to know what better method of marking could be found. I advised all who were interested in solving the problem to order at once Monroe's book, "Measuring the Results of Teaching,"<sup>2</sup> and to think the matter over until our next meeting.

<sup>2</sup> Monroe, Walter S., *Measuring the Results of Teaching*. Boston: Houghton Mifflin Company, 1918.

### THE SECOND MEETING

In preparation for the next meeting I made a list of twelve history questions on the events leading up to the American Revolution. The questions were as follows:

1. How were laws made for the colonies?
2. What sort of governments had the colonies?
3. How was the commerce of the colonies regulated?
4. What kind of a king was George III?
5. What was the Stamp Act?
6. What were the objections to it?
7. What was the Stamp Act Congress and what did it do?
8. How did the British try to keep the colonists in order?
9. What friends had the colonists in Great Britain?
10. What was the Act of Association?
11. How was it enforced?
12. Distinguish between the real and the apparent reasons for the Revolution.

When we were again assembled I passed two copies of this list to each teacher with the request that they rank the questions one, two, three, etc., in the order of their difficulty beginning with the easiest, and that they write these ranks opposite the questions on one of the papers which they had received. When they had finished, I asked each teacher to read the ranks she had assigned to the questions beginning with question one, while I tabulated them on the board in such a way that vertical columns would show the various ranks assigned to the same question and horizontal rows the ranks assigned to all the questions by each teacher. I regret that I have lost my copy of the original table, but the general arrangement (for four teachers only) is shown below without the correct figures.

Teachers	Rank Assigned to Each Indicated Question											
	1	2	3	4	5	6	7	8	9	10	11	12
A	6	4	2	7	9	12	3	8	5	1	10	11
B	2	7	11	3	9	10	4	6	12	5	8	1
C	5	12	8	3	10	4	7	1	6	11	9	2
D	1	5	12	4	6	9	11	7	8	2	12	3

This tabulation showed such wide variations in the ranks assigned to the same question by different teachers, that a lively



interest was aroused. In the ensuing discussion further conclusions were reached which may be summed up as follows:

1. That if a test is to measure accurately a pupil's knowledge of the ground covered, the questions must be so selected as to bring out the most important ideas in the subject matter.

2. That there should be a large proportion of thought questions in order to call for something more than a parrot-like repetition of memorized facts, so that the better students may be enabled to demonstrate their superior reasoning abilities.

3. That some accurate method of weighting the questions must be used if accurate measurement of pupils' abilities and knowledge are to be expected.

4. That the weighting of questions by individual teachers on the basis of their personal judgments is mere guesswork since, as was shown by our experiment, they cannot even judge accurately the relative difficulty of questions.

5. That the average of the judgments of a number of teachers is apt to be more accurate than the judgment of a single one.

In line with this last conclusion we then proceeded to find the the average rank assigned each question and, with these averages as a basis, to rank the questions according to their relative difficulty as determined by the combined judgments of the teachers. Next I asked them to use these ranks as a guide and to assign values to each question so that the sum of the values would equal one hundred. It was observed that for each question the variations in values were not as wide as the variations in ranks had been. This was attributed to the fact that the order of difficulty used as a guide and the limit of one hundred placed on the sum of the values would necessarily permit much less variation. The results are shown in Table III.

The lesson of the day had been so well assimilated that someone suggested that since the ranking of the questions by each individual was all guesswork as proved by our experiment, then our averages were only averages of guesswork and hence likely to be far from reliable. For her part she did not see that we had any real proof that question twelve for instance was any harder than question three, and more than that she didn't see how we were going to prove that it was. Then came what I was hoping for but hardly expected.

"The eighth grades have recently completed their study of the period of history which the questions cover. Why not give them

TABLE III. WEIGHTS ASSIGNED TO TWELVE HISTORY QUESTIONS  
ACCORDING TO TEACHERS' JUDGMENTS

Question No.	Average Estimated Rank	Average Estimated Value
1	8	10
2	4	4
3	9	12
4	1	1
5	7	9
6	5	7
7	2	2
8	6	8
9	3	3
10	11	14
11	10	13
12	12	17
		Total...100

as a test to these grades and so find out which questions are hardest?" This from a bright girl who had attended one summer session at Plymouth Normal.

"How could you prove which questions are hardest by doing that?" I asked.

"Why, if the questions were given to a large number of pupils, would it not be safe to conclude that the one which is missed the most times is hardest and that the one missed the next largest number of times is the next hardest, and so on?"

The practical side of this suggestion appealed to the majority of the teachers at once and they were eager to try it. Since this was the very thing I had intended to propose in order to get material for discussion at our next meeting, you may be sure that I was not slow in taking advantage of their enthusiasm. So it was decided to give this list of questions as a history test to all the eighth-grade pupils in the district. The teachers were to bring the corrected papers with them to the next meeting.

### THE THIRD MEETING

I watched the faces of the teachers as they gathered for our third meeting. The dazed look had passed from most of them by this time and a look of intelligent comprehension was taking its

place. The books which they had ordered at my request had arrived during the week and they had been reading them. They were apparently beginning to get their bearings. There was a business-like air in the way they took their seats and prepared for the afternoon's work that augured well for the future.

The meeting having been called to order we began to investigate the results of the history test. It had been given to 106 pupils. As I called a question by number, each teacher told me how many times her pupils had missed it. I wrote the figures on the board, a column for each question. When the results had all been read they were summed and tabulated as in Table IV.

TABLE IV. RANK OF HISTORY QUESTIONS IN DIFFICULTY, BASED ON  
NUMBER OF TIMES MISSED

Question No. . . .	1	2	3	4	5	6	7	8	9	10	11	12
Times missed . . .	28	44	40	8	23	20	35	29	16	60	56	51
Real rank . . . . .	5	9	8	1	4	3	7	6	2	12	11	10

This table shows that question four is easiest since it was missed the least number of times and that question ten is hardest since it was missed the greatest number of times. Also, that question ten is seven and a half times as hard as question four because it was missed seven and a half times as often.<sup>3</sup> This would indicate that, in weighting the questions, number ten should be valued seven and a half times as much as number four. When these points had been discussed, even the teacher who was dissatisfied at our last meeting was convinced that we had found a fairly accurate method of evaluating questions.

The next step was to find values for the questions according to their relative difficulties. We first assigned to the easiest question (number four), which was missed eight times, a value of one. Since the next question in order of difficulty (number nine) was missed sixteen times, or just twice as often as number four, we gave it a value of two. Question six was missed twenty times. As twenty is two and a half times eight, this question was valued two and a half. The same method was followed throughout.

\* Statistical difficulties involving the location of the zero point were ignored.

The sum of these values was found to be 51.5. Since the sum of the teachers' estimated values (Table III) was one hundred, it was necessary for comparative purposes that the sum of these values should also be one hundred. Evidently if each of them were multiplied by two, the sum of the resulting proportionate values would be 103. This was near enough to one hundred for our purposes and it had the advantage of yielding whole numbers. These may be seen in the last column of Table V, which summarizes the results of our study of the history questions.

TABLE V. SUMMARY OF RANKS AND VALUES FOR EACH OF TWELVE HISTORY QUESTIONS

Question No.	Estimated Rank	Real Rank	Times Missed	Estimated Value	Derived Value	The Same Multiplied by 2
1	8	5	28	10	3.5	7
2	4	9	44	4	5.5	11
3	9	8	40	12	5.0	10
4	1	1	8	1	1.0	2
5	7	4	23	9	3.0	6
6	5	3	20	7	2.5	5
7	2	7	35	2	4.5	9
8	6	6	29	8	3.5	7
9	3	2	16	3	2.0	4
10	11	12	60	14	7.5	15
11	10	11	56	13	7.0	14
12	12	10	51	17	6.5	13

After the teachers had rated a few history papers using the two sets of values, we concluded our experiments. Crude and inaccurate they were, of course; but they were not intended to contribute to the statistics of educational measurements. They were rather designed to exemplify to the teachers that spirit of scientific investigation which is so rapidly making over our school system, and in particular to convince them that teachers' ratings as ordinarily made are unreliable. And they had served well. All but two or three of the teachers had by this time expressed their firm conviction that tests devised by teachers and rated according to individual standards are of little use in finding out a pupil's real knowledge or ability, or in determining his standing with regard

to other pupils of his age and grade. These two or three teachers no amount of accumulated evidence could convince, because everything was unalterably settled to their way of thinking before the experiments were tried. The old methods had been in use for hundreds of years and must, therefore, be better than anything new. It is useless to waste time with such people. The only thing to do is to get rid of them at the first opportunity.

A few more points were cleared up by general discussion. Someone objected that, with a passing mark of seventy, it was evident from the scores that two-thirds of the pupils would fail to pass the test. This brought up an important point. Is it fair to mark pupils on a percentage basis with 100 standing for perfection? Some thought it was. Some thought it wasn't. Most hadn't thought about it, but since the matter was called to their attention they were inclined to think that it was hardly fair. What fairer way could I suggest?

I then explained what is meant by a median score, demonstrated with figures on the board the difference between median and average, pointed out the advantages of the median, and then proposed that we find the median score of the 106 history papers using the derived values for marking. This was found to be 65.1, to which I added 10 percent of itself and suggested that we use the result, 71.6, as a standard score. Any child who got this score would be given a mark of 100. That is, a pupil's mark would be the percent that his score was of the standard score. For instance if pupil A had a score of 26, his mark would be 26 divided by 71.6 or 36. If pupil B scored 63, his mark would be 63 divided by 71.6 or 90. A pupil who scored 85 would receive a mark of 118. In using letters for marks this pupil would be marked A+. It was pretty well agreed that this method of marking would be eminently fair, provided standard scores were available. The method may not be scientifically accurate; but it is certainly fairer than the ordinary method of marking on a percentage basis, and it has the advantage of simplicity.

Then someone wanted to know if we should do away with teachers' tests entirely and depend on the standardized tests altogether. We finally decided that teachers' tests should be used often by way of written reviews for the benefit of the pupils, but that the results should not have too much weight in determin-

ing the pupil's final standing. The pupils themselves, however, need not know how much or how little weight these tests might have on their grading for promotion.

Most of the standardized tests which I had ordered were at hand for this meeting. Samples of these were given to the teachers to study in connection with their new books on educational measurements. After explaining briefly the painstaking methods employed in deriving these tests and scales, I dismissed the meeting.

#### THE FOURTH MEETING

Our fourth meeting was devoted to the actual work of giving and scoring the tests. A few obvious facts were first emphasized, such as the need of accurate timing in cases where time was a factor, the fact that no help should be given the pupils other than clear and complete directions, and the fact that when directions accompanied the tests they should be followed explicitly. I also warned the teachers to beware of copying on the part of pupils; and I then proceeded to administer the tests to the teachers just as they should be administered in the classroom. As each test was finished we corrected and scored it, each teacher correcting and scoring her own paper for practice. In this way many obscure points were cleared up. Each teacher had seen each test given and had herself corrected and scored a sample of each test properly. They kept these corrected samples to use as models in correcting the tests which they were to give in their schools. Unless some such precaution is taken beforehand, the superintendent is sure to be surprised and dismayed when he gets the first packages of tests from his teachers. He will find that he must either return them to the teachers with time-consuming directions and explanations or go over most of them himself in order to get accurate results. I had been through such experiences before on a small scale and intended to avoid them this time as far as possible.

Since the tests were to be given to pupils the following week, each teacher then received a sufficient supply for her school. The tests were to be corrected and returned to me by mail within ten days. Unless a definite time limit is set and strictly adhered to, batches of tests from the various schools will come straggling in for two months after they are given out. Thus a few procrastinating teachers can delay the superintendent's part of the work to a

very annoying extent. In order to tabulate and study results for the district as a whole he must have all his data in hand at one time and as soon as possible after the tests are given out. In this case I was particularly anxious to have all the tests in on time as the grading of the schools was being delayed pending the results. So I laid special emphasis on the ten-day limit.

The teachers were further warned that, although I had no reason to distrust anybody, the matter was too important to permit taking any chances. Accordingly, I proposed to check the work of each teacher by giving one or two of the tests in her school *after* she had given all of them. By comparing the results of my tests with theirs of the same kind I could readily detect any gross carelessness or intentional dishonesty on the part of the teachers. There is considerable temptation for some shortsighted teachers who know that their own efficiency is being measured by these tests, to stretch the time limit or to give illegitimate aid to the pupils, or even to drill on the test itself, in the effort to make their classes show up well. Of course any intelligent teacher, knowing how the tests are used, would see the shortsightedness of such a policy since it is evident that what might be gained on one test would be lost on the next. However, two or three such dishonest teachers may, at first, work sad havoc with the accuracy of a superintendent's final figures regarding the efficiency of his schools and teachers unless he takes some precautions to discover the culprits at the start. Hence my method of checking their work.

Above all, tests should not be permitted to fall into the hands of pupils. Since they are to be used again and again to measure progress, teachers should be impressed with the importance of safeguarding them. As fast as the papers are finished they should be taken up to prevent possible copying of the questions or problems by the pupils in preparation for future tests. Of course, this does not apply in the case of the writing, spelling, and composition scales because of the different manner in which they are used. In fact it is well to display these scales on the walls of the school room so that the pupils may try to measure their own work.

This ends the account of how the cooperation of these teachers was secured in the use of standardized tests. It may not be intensely interesting in the reading, but it was assuredly interesting in the doing. Results since have proved its value. I can recommend the general procedure to anyone with a similar problem to solve.

## FORMULATION OF METHOD IN READING<sup>1</sup>

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The rapid accumulation of scientific data in education is making possible the formulation of a far more effective educational practice than has hitherto existed. In reading this is particularly true. The physiology and the psychology of reading have been investigated, so that one can now give a reasonably accurate scientific description of the act of reading. How the individual recognizes the printed symbols and how he assimilates the content underlying them can be stated with some degree of definiteness. The results of objective measurements of reading ability have thrown a great deal of light both on the reading act and the teaching process. In a word, a considerable body of facts has been accumulated in the last few years as the outcome of various types of investigations. The result is that we have a body of information sufficient to form the basis of a reasonably valid, scientific procedure in teaching.

Advance in teaching reading, however, has not kept pace with increased knowledge about reading. One sees even in the so-called best schools practices which can in no way be justified in the light of present knowledge. I am convinced that there is a very great need of a reformulation of practice on a somewhat higher plane. It will do little good to accumulate more data from measurements and investigations until better and wider use has been made of information now at hand. In making these statements, I am not unmindful of the great progress which has been made during the last ten years, and especially during the last five years, in the teaching of reading.

Of course, the limits of this address would preclude a complete discussion and reformulation of procedure in teaching reading. It is my purpose, however, to indicate some lines along which this reorganization should take place, and to suggest certain definite steps in the direction of improved methods of instruction which need to be taken immediately, in order to bring practice more

<sup>1</sup> An address delivered before the National Association of Directors of Educational Research, at Cleveland, Ohio, February 26, 1920.



nearly into harmony with the enlarged body of scientific information which has been brought forward by investigators in the last few years.

### METHOD OF APPROACH TO THE PROBLEM

The best approach to this problem of the pedagogy of reading must involve three distinct lines of investigation.

1. The first important step is a study of those fundamental and significant facts of the physiology and psychology of reading, which throw light upon the processes involved in the act of reading.

2. From a study of all the known facts at hand in this field, certain hypotheses or tentative principles of teaching may be established, and we may then proceed to teach reading in accordance with the principles thus established. In a word, on the basis of the data from the physiology and psychology of reading, it is possible to develop an experimental technic of instruction for practical use.

3. Before we can be assured that our method is correct, it must be evaluated in terms of the ability of the children to read. Thus elements of efficiency and points of weakness will be discovered. A process by which the former are selected and retained and the latter eliminated will ensue, until a pedagogy of reading has been evolved, which will be in harmony with the laws of the most economical learning.

This, in brief, is the method which must be pursued not only in reading but in all school subjects in order to advance toward better methods of instruction. As the body of significant facts concerning the mental processes of children and the nature of the learning process accumulates, this gradual rebuilding of educational practice becomes one of the most important problems of the day.

### DEFINITION OF READING

Preliminary to a discussion of classroom technic in reading, I should like to state definitely what my conception of reading is. In a word, I desire to define reading in a way which will indicate what the essential factors in the process are, from my point of view.

To read, as the term is here used, is to interpret, organize, remember, and deliver the thought conveyed by the symbols

of the printed page. This statement indicates that there are three main factors involved in effective reading ability. In order to be able to read at all, the individual must interpret the content underlying the printed words on the page. But to understand only is not enough. It will be of little benefit to the pupil merely to comprehend his history lesson as he reads it over. If later, when the book is closed and he is in the class, he can remember little or nothing of what he read, he will not be able to participate effectively in either recitation or discussion. Therefore, his reading will not be effective unless, in addition to interpreting and assimilating ideas, he can also recall them. To carry the thought one step further, his reading cannot be said to be effective unless he can in some way return the ideas which he has assimilated. This may take the form of reproduction, or of using these ideas in some appropriate way. Therefore, effective reading involves carrying the thread of the story, argument, or discussion, grasping all of the essentials, sensing the significance of the whole, retaining it in the mind in well-organized form, with the ideas in rational sequence, so that they can be delivered in some form. According to our conception, this is real reading. Ability to read and ability to study are, then, in part synonymous terms, although study ability of course includes more than reading ability.

What I have defined above is the complete act of reading, and I am quite aware that it probably ought not to be called reading. I realize that in many cases interpretation of what is read is entirely sufficient. Today, for example, I desired to go from one part of the city to another. With printed directions in my hand, all I needed to be able to do was to understand the directions. However, there are many cases in school and in life, in which ability in what I have called the complete act of reading has so great value that it needs to be taught to all children. In fact it is an indispensable ability.

#### FACTORS IN READING EFFICIENCY

In determining reading efficiency, two factors must be taken into consideration. In the first place, of two readers whose grasp of content is equally great, that one who can read the larger amount in a given time has the greater reading ability. Rate of reading, then, is one of the two factors. In the second place, of

two people who can read the same amount in a given time, that one whose grasp of content is greater is the better reader. In this case the individual who can reproduce the larger amount of what he has read, and who can do so the more correctly is the more efficient. The two things, then, which enter into a complete measure of reading ability are: (1) rate of reading; and (2) degree of effective comprehension (including ability to interpret, organize, remember, and deliver in some form).

Now, the main purpose in teaching children to read is the development of power to get thought from the printed or written page. The fact that a child or a class has the ability to pronounce words fluently cannot always be taken as an indication of good reading, for it may not be accompanied by adequate comprehension of the thought. For example, a child may be obliged to spend a half hour to read a page so that he comprehends the thought sufficiently to reproduce 80 percent of the content. Another child may be able to read the same page with equal understanding in a few minutes. The second pupil is, of course, a much more efficient reader. Real efficiency demands a satisfactorily rapid rate of reading combined with an adequate power of comprehension. In the measurement of reading ability it is desirable to combine these two factors into a final measure which shall represent the total reading ability of a child or a class. Perhaps it will prove to be impossible to do this. Reading ability may be two-dimensional.

#### INITIAL STEPS IN TEACHING READING

The reading lessons of the first three months of school are all-important. They may be so conducted as to facilitate or hinder economical learning during the following years. The classroom technic is important. We now know from investigations that reading is a complex, muscular, photographic, and assimilative process. There is every reason to believe that the act of reading is subject to the laws of habit formation. If the teacher's procedure inflicts upon the child during the first three months habits unfavorable to effective reading ability, they will be difficult to break in later years.

Not long ago I was familiar with a class which was taught reading during the first year by the alphabet method. The children

were taught to spell each unfamiliar or difficult word. This resulted in a pronounced habit of attention to textual details. At the beginning of the second year a complete change in method was adopted and every device known to modern educational practice was used to break the bad habits formed during the first year. Rapid silent reading from books, quick recognition devices for reading the meaning of words and phrases, and an abundance of silent reading both in school and out were persistently used. At the end of the fourth school year, however, not one of these children had ceased to pause and silently spell each difficult word. They seemed incapable of visualizing a new word quickly and accurately on account of the early habit which appeared to persist in spite of all efforts to break it. This is not an uncommon experience on the part of teachers. May it not be, then, that when an early habit of reading with attention to textual details has been established it is impossible ever to eradicate it completely? May it not be that during the first year either readers are made or bad habits are permanently developed? If this is true, it is highly important that a technic be established for the first steps in reading, whereby efficient habits of word recognition and of assimilation of content may be provided.

I believe that some of our practices should be radically changed in some important particulars, and that real reading must be secured from the outset. The good reader in perusing the printed page, while words are continually before his eyes, does not really see the words. He is engaged primarily in thinking meanings, in comprehending the thought. The early lessons in reading should produce this effect. It is my conviction that most of our methods are seriously at fault, because they produce a consciousness of word forms which is both unnecessary and highly unfavorable to the development of efficient reading habits.

How, then, may the first steps in reading be taught so as to reduce word consciousness to a minimum? In answering this question I shall describe the procedure which is used in the training department of the State Normal School at Oshkosh.<sup>2</sup>

<sup>2</sup> Material assistance has been rendered in preparing this section by Miss Ruberta N. Smith, head of the department for training primary teachers, at the State Normal School at Oshkosh. Several of the following paragraphs have been written by her.

## THE FIRST LESSONS

The earliest reading lessons involve only words which are already a part of the children's oral vocabularies and which are clearly associated with familiar objects, ideas, or experiences. The teacher's problem is to make associations between the known auditory forms and the unfamiliar visual forms.

Reading in the first grade does not begin for some time after school opens. Frequent periods, however, are devoted to story telling, simple dramatization, and conversation about interesting topics. On these topics the children are led to express themselves freely and spontaneously. A basis is thus laid for the first reading lessons. This goes on for days and is guided by the teacher so that the words, phrases, and sentences on which she plans to base the first reading lessons are used again and again by both the children and herself.

After a time short sentences, the auditory forms of which are familiar to the children, begin to be introduced. For example, perhaps some of the children have pet rabbits, and on a certain day these are brought to school and become the center of interest. The next morning a life-like picture of the mother rabbit and the young rabbit may appear on the blackboard with the sentences *Here is big mother rabbit* and *This is little baby rabbit*. On the previous day these two sentences were used purposely by teacher and children, and they are now used again many times. The visual forms of these sentences, seen in connection with the objects and in connection with the frequent oral repetition of the sentences, quickly become associated with the objects and the auditory forms. These sentences are to the children unanalyzed, visual wholes representing certain meanings, just as spoken sentences are to young children complexes of sounds conveying certain meanings which they grasp as unanalyzed wholes. Without carrying the illustration further, I may say that many short sentences are made meaningful to the children in this way as unanalyzed visual wholes, in a more or less incidental manner, before any reading is attempted.

In presenting the first reading lesson the teacher leads the children into conversation on some topic about which they have talked on previous days, at the outset arousing the interest and securing the attention of the class. When the latter is at its maximum, the

teacher writes a sentence of from two to four words on the black-board, after she and the pupils have used it orally a number of times. This sentence is at the center of interest in the conversation. Both teacher and children will naturally have occasion to repeat it several times. During the conversation, and at a point where the sentence would naturally intervene, it is written by the teacher as she utters it, the visual form thus appearing while the auditory form and the thought are in the attention of the children. As the sentence is repeated, the teacher points to it so that the children realize that the particular visual complex on the board stands for the particular meaning in question.

The sentence is then read by various pupils until all the children in the class can react to it as a whole without hesitation. Two sentences closely connected in thought and requiring as few different words as possible are treated in this manner in the first lesson. Since the children are not focally and explicitly conscious of word forms, much less of letters or phonetic elements, a right start in reading has been made.

On the second day, the sentences of the first day are reread several times and one more sentence is developed, in the same manner as were those of the previous day. This continues for a number of days, not more than three new sentences being introduced in two days. Each day the sentences previously developed are reread several times, and since they form a connected story, this rereading is always interesting. It is held to be excellent practice for the children to react in this way again and again to an entire sentence as a whole. They soon catch the idea and when a sentence is pointed to, they respond with the whole thought as quickly as in their own animated conversation. To get established the habit of reading entire sentences as wholes, in the same connected manner which children use in conversation, with the thought focal in attention, is the fundamental object at the outset in reading. In order to accomplish this, one can afford to make haste slowly.

After a number of lessons the children have a sufficient vocabulary so that for two or three days new sentences may be constructed with the words already familiar. Whole sentences continue to be the basis of instruction. The object is to read as much as possible with the small vocabulary. Words must be

repeated again and again, but always in new combinations, and in connection with a content of vital interest to the children.

Blackboard work continues for six weeks or two months. It furnishes opportunity for visualizing sentences with a very brief exposure. A shade hung at the top of the board is a useful piece of apparatus. Sometimes sentences may be written on strips of cardboard and briefly exposed. In none of this work are the children ever allowed to read sentences word by word.

From the very first, these lessons consist of connected stories. Even a reading lesson of a half-dozen sentences is in the form of a story about something which will grip the interest of the children and hold their attention. It ends in a climax which leaves them with a desire for further reading. Especially does the teacher seek to avoid the kind of disconnected, disjointed sentences often found in primers.

#### READING FROM BOOKS

At the end of about two months of blackboard work, the class begins to read from an easy primer. The transition from blackboard script to the printed page is usually accomplished with very little difficulty.

The reading continues to follow quick perception lines. Slow rendering of the thought word by word is always avoided. For example, each child may be provided with a strip of cardboard which may be moved down to expose a single line or sentence and, then, at the word of the teacher, quickly moved back, thus permitting only a glance at the line. The children should at all times get the entire thought of a sentence before they are permitted to read it orally. It is not recommended, however, that children be required to look away from the book or at the teacher all the time they are giving the sentences.

It is not necessary or desirable to read one primer through before leaving it. The first ten or twelve pages of a half-dozen or more primers should be read first. Later in the year these books may be finished and several children's classics may be read. The main purpose is to read as extensively as possible from easy and interesting material.

### DEVELOPMENT OF NEW WORDS

The matter of word development is of the greatest importance in the early stages of reading. If the association between the visual form and idea is faintly made, the visual form will recall the idea faintly or not at all.

During the earliest stages of reading each new word, as has been previously suggested, is carefully developed through pictures, objects, and conversation, and presented in sentences. By the middle of the year, however, when the children are reading rather extensively from books, it is not necessary to develop all new words previous to reading. When an unfamiliar word occurs the teacher pronounces it, if the child who is reading is unable to do so. He pronounces it after her and the reading continues without interruption. The teacher notes a few of these words. After class she writes them on the board and devotes two or three minutes to practice in pronouncing them as unanalyzed wholes. The teacher pronounces each word slowly, clearly, and distinctly as a whole and the children pronounce after her in the same way. The period ends with a little practice in pronouncing the various words quickly as the teacher rapidly points to them. With a little instruction by the teacher, children thus catch the knack of pronouncing words merely by practice in pronouncing them. Experience indicates that children unconsciously work out their phonetics in this manner without such a large amount of abstract drill as is sometimes given. A very large amount of time and energy is thus saved.

### VISUAL ANALYSIS OF WORDS

The word-pronunciation exercises of the first year are continued in the second year, and during the latter part of the year they take the form of practice in the visual analysis of words. This is conducted in the same general manner as that suggested for the exercises in word pronunciation. At the close of each reading lesson the teacher places upon the board, as previously, a half-dozen or more of the difficult words of the lesson. She indicates the syllabic form of each, pronounces it distinctly, and has the pupils do so. After the words have thus been gone over several times, the teacher points rapidly to the different words and has them pronounced quickly as wholes. After about two



weeks of this kind of work, the pupils begin to have practice in dividing into syllables and pronouncing words taken from the reading lessons and written on the board. Practice is given in quickly glancing at words on the board followed by syllabication and pronunciation. Children are encouraged to pronounce unfamiliar words at sight as they occur in the reading. By the time they are well started in the third grade they are able to syllabicate and pronounce any ordinary word met in their reading.

Not over four or five minutes a day are devoted to the exercises in visual analysis, which serves as the rounding up of the practice in word pronunciation of the first year and a half.

### DRILL ON WORDS AND WORD GROUPS

Children must be taught to grasp not only words but also word groups as wholes. The ability to read word groups by merely noting some familiar characteristic contributes greatly to rapid reading. To develop this ability drill is given with cards containing words and word groups of frequent occurrence. This drill begins after some facility in reading has been acquired, not earlier than near the end of the first year.

The drill is rapid and the periods brief. As nearly instantaneous perception as possible is required. The technic of the drill is such that the card is raised to the proper position for the recognition and then lowered in a way which will provide an exposure sufficient for one brief glance with the card at complete rest. During its movement into position and back the words must not be exposed.

### PHONETIC DRILL

Certain considerations must be taken into account in connection with the problem of phonetic drill. What reading habits are most desirable? What procedure in teaching is conducive to their development? These are questions which must receive serious consideration. Speed is a highly desirable factor in reading ability, merely as a timesaver if for no other reason. All habits which lead to slow and ponderous reading must be avoided. Speed in reading depends in part upon the size of the units of recognition, i.e., the amount which can be seen by the reader during eye pauses, and in part upon the duration of eye pauses.

The individual who sees only a small portion of the line during an eye pause must make many fixations. The longer the eye pauses the slower will be the reading, other things being equal. Will not a habit of attention to textual details inevitably result in slowness in reading? Will not a habit of recognition through dominant characteristics of words and phrases, with their minute particulars marginal in attention, become a distinct aid in interpreting thought? Is not the inevitable result of two or three years of persistent drill on the isolated elements of words bound to be a predominant habit of attention to the minute particulars of words? Can the eye be trained to take in large units by practice on small ones? Will not prolonged attention to word forms effectively prevent the development of a habit of thinking meanings as one reads?

In view of the facts at hand, it seems to me to be a radically wrong procedure to introduce such a large amount of abstract phonetic drill in the earliest stages of reading as is often found. It seems to me to be a very obvious inference that the predominant emphasis in method at the beginning must be upon the instantaneous recognition of words and word groups, the mental process being concerned with meanings rather than with word forms.

Is not the child afforded the best kind of drill on phonetic elements when he is made to react to them constantly in reading sentences containing words in which they occur? May not the additional time usually devoted to abstract phonetic drill profitably be given to more reading? Will not children thus acquire a feeling for sound and an unconscious mastery of phonetics which, in the end, will give them sufficient power over new words and avoid developing the consciousness of words which prolonged attention to their minute particulars is likely to produce?

It seems to me that here is a definite problem which should be subjected immediately to scientific investigation. It will be futile, however, in the comparison of reading methods to test groups of children taught by different methods and draw conclusions from the results without taking into consideration a variety of other factors. For example, the time elements must be the same in both groups and the amount of supplementary outside reading must be the same. At least one investigation of this problem has fallen far short of securing a valid result on account of plain

disregard of important factors of this kind. A carefully controlled experiment with every other factor identical in two groups of children with the exception of the presence of phonetic drill in one and its absence in the other would yield a most interesting result. At present, I believe the data at hand raise serious doubt as to the value of a large amount of abstract, phonetic drill during the earliest stages of reading instruction.

#### EXPERIENCE WITH ONE CLASS

The children of the third grade in the training department of the State Normal School at Oshkosh spent the first two years in extensive reading of simple stories for pure enjoyment, with their attention entirely on the content. During the reading period all words not instantly recognized were told immediately. Word development was taken up in separate periods, the words being incorporated in phrases for drill, and no attention being called to the elements of words. Approximately fifty minutes per day were spent on all phases of reading, including silent reading, word development and study, and oral reading. Silent reading was begun early in the first year. Before the end of the second year the children began to pronounce new words without help, applying independently the general knowledge of phonic laws acquired unconsciously through much reading.

Beginning with the third year, the children were encouraged to organize the phonic facts so gained and the four or five most common principles of phonics were taught. A short period at the end of the day was devoted to *pronouncing long words*, as the children called it. This period became so popular that only with difficulty were the children persuaded to omit it on special occasions. Recently they were pronouncing with ease and enjoyment such words as hydrocarbon, hydrometer, tuberculosis, capitulate, centigrade, epidote, actuate, and many others of equal difficulty, without the aid of diacritical marks or context.

These children have developed insatiable appetites for reading, and they read intelligently and accurately with good expression and excellent speed. Of the two daily reading lessons in the third grade, one is devoted to oral and the other to silent reading. The children are capable of reading any material suited to their age in content, and they read great numbers of books during spare periods and out of school hours.

## READING ABILITY AS A PHASE OF STUDY ABILITY

Definite training in silent reading is needed for the purpose of developing in children the ability to study efficiently. This training should begin early in the first year and continue until a mastery of the printed page has been developed. Schools need to take very pronounced steps in the direction of developing a special technic for teaching silent reading.

Not long ago I observed a lesson which seemed to me particularly worth while for intermediate grades. While visiting schools in a certain community, I stepped into a room in which were third and fourth grades. I observed that the teacher was asking questions from a book. The children appeared to be reading silently and rather rapidly. Suddenly the teacher clapped her hands. The children ceased reading immediately and closed their books. Various children were then called upon to tell the substance of what they had read. They appeared to me to have a remarkable ability to reproduce in great detail. I remained in the room, and when the reading began again it was conducted in the following manner. A question was asked by the teacher to which the first two or three sentences of the paragraph furnished the answer. The children read rapidly to get the facts. By the time they had about grasped the meaning of these sentences another question came from the teacher, and the process was repeated. In this manner there was a series of rapid-fire questions from the teacher and very rapid silent reading on the part of the class. In this way the class covered in a few minutes about two pages before the teacher again clapped her hands as a signal for the closing of the books. Again there was very efficient oral reproduction of what had been read. I learned that the reading was entirely at sight.

I remained throughout the period, which lasted about fifteen minutes. It was the best example of competent teaching of silent reading which I have ever seen. By her manner of questioning the teacher forced the class to read at their maximum ability for a short period. Five times as much was read as is ordinarily read in an oral reading lesson. It should be pointed out that it is utterly futile to attempt to teach silent reading, from the point of view of developing study ability, by letting the pupils dawdle along at their own pace.

Silent reading should begin early in the first year. In its simplest form, it consists in following directions such as *Bounce the ball*, or *Run to the door*—these directions being developed by the class as a game. A little later a thoroughly familiar reading vocabulary may be used and a group of connected sentences presented one after another on the blackboard. The response to this type of lesson may be discussion, dramatization, or illustration, with the use of crayons, scissors, paper, clay, sand table, or blackboard. For example, a group of half a dozen sentences may describe some adventure of a kitten. After the reading has taken place silently sentence by sentence, the children may play the story or discuss the result of the adventure or its effect on the kitten, or spend a seat period illustrating the points made in the story.

More formal silent reading may begin in the second half of the first year. Children should now be able to grasp short sentences by quickly glancing through them, sensing the meaning without being explicitly conscious of the minute particulars of word forms. Good teachers will adopt devices that give the class but a moment for glancing through a sentence. The class may read silently a group of a dozen or more sentences, after which different pupils may reproduce orally the meaning of what was read. This is the beginning of teaching to read silently and of teaching to study.

It is held that the ordinary oral reading lesson is unproductive in grades beyond the third. Instead of this the reading may well consist of a relatively small amount of motivated oral reading and a large amount of silent reading for the purpose of teaching pupils how to study efficiently. The regular reading period as a separate part of the program may be dispensed with and silent reading may be taught in connection with other subjects. This will result in a considerable saving of time. For example, on one day the reading lesson may consist of silent study of a history assignment and may be conducted on history time. On another day geography may furnish the basis for a silent reading lesson. Again, on a third day civics may serve as material for reading. Each of these lessons will afford definite training in silent reading from the point of view of teaching how to study. Papers and special reports may be prepared from time to time. The reading of a report to the class is excellent motivated oral reading. Per-

haps a pupil may find at home a book which contains material not found in any of the books at school. Such a pupil will delight in bringing this book to school and reading from it to the rest of the class. The situation is thoroughly motivated, because he knows something which the rest do not know and therefore has a definite message to convey to them. This provides an incentive for him to read as well as he can. The audience desires to get the information and has an incentive to listen.

Without going into further detail it is sufficient to say that the resourceful teacher will have no difficulty in utilizing all of the different subjects of the curriculum as valuable material for training in silent reading. There will be no difficulty in finding plenty of situations for motivated oral reading. Whenever a pupil reads silently with a definite purpose to get information, or when he reads orally with a definite aim to convey information to others, either type of reading is properly motivated. It is doubtful if any other kind of reading is justifiable. It is also to be seriously questioned whether a pupil profits greatly from any other kind of reading.

#### TESTING AND DIAGNOSING READING ABILITY

Although much progress has lately been made in measuring ability to read, all that has been done constitutes but a good beginning. One of the great needs in the measurement of reading ability is that tests be devised for determining levels of study ability. I have contended that the best kind of material for a reading test is a connected passage in the form of a short story, a description, a piece of exposition, or some similar kind of writing in which the child's ability to react to the whole selection or to as much of it as he can read in the time given is tested. We greatly need as test material connected passages of various known degrees of difficulty. Such material would not be especially difficult to prepare, and with it we could apply to a given child or class several tests, each more difficult than the previous one, until the exact level of study ability of the child or the class had been determined. It would be necessary to have several alternative tests for each degree of difficulty, so that a class or a pupil could be tested at frequent intervals.

Such a series of tests as this would prove of inestimable value in the upper grades and high school for the purpose of placing

pupils of approximately equal study ability in the same groups. One of the greatest sources of waste in teaching reading has been in keeping children under instruction in a given class after they have advanced to a level of reading ability far beyond that contemplated by the instruction. Probably great harm has been done such children by keeping them dawdling along at a pace far below their ability. On the other hand, there are pupils in every class in the upper grades and high school, whose level of study ability is so much below that contemplated by the books in use and the instruction given, that it is impossible for such pupils to succeed. A reading test designed for the purpose of diagnosing levels of study ability, together with instruction in silent reading, would prevent many of these pupils from becoming failures and would remove a source of waste and inefficiency from the schools.

## THE CORRELATION RATIO

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In the March, April, and May numbers of the JOURNAL OF EDUCATIONAL RESEARCH there have appeared articles by the writer describing methods for computing the coefficients of correlation and regression that are shorter and simpler than those that have heretofore been in use.

The purpose of this article is to describe a short method for computing the correlation ratio which is a measure proposed by Pearson for computing correlation in distributions in which the relationship between the two series is a curve relation rather than rectilinear. Such relationships are frequent.

For example there may be a real relationship between the amount of money spent on municipal sanitation and the decline in the death rate. In extreme cases, such as have recently existed in tropical America, conditions have been found such that slight expenditures for sanitation resulted in marked reductions in sickness. As improvements go on, however, it is found that the expenditures must be greatly increased to effect even small decreases in the death rate. Similar conditions are common in the field of education as, for example, in the relation between the amount of time devoted to the practice of penmanship and the quality of the results obtained.

The coefficient of correlation will not accurately measure these curvilinear relations and the correlation ratio is the device that is proposed to obtain a trustworthy measurement of them.

The correlation ratio can only be computed for tables of distribution. It is the ratio between two standard deviations. One of these is the standard deviation of all the values of one series—say the subject series. The other standard deviation is that of the averages of the columns of the subject values from the average of all the subject values in the table. If the relationship of the two series is rectilinear the correlation ratio is equal to the coefficient of correlation. If it is curvilinear the ratio will be greater than the coefficient of correlation. It is always positive and never exceeds 1. Its symbol is  $\eta$  (eta). The best description of



its derivation and use is found in Rugg's *Statistical Methods Applied to Education*.

The computation of this measure may be illustrated by finding both the coefficient of correlation and the correlation ratio for a simple distribution table in which the relationship is roughly curvilinear. The coefficient of correlation is found by the formula:

$$r = \frac{\begin{array}{c} \text{Sum of products of subject and relative items} \\ \text{minus} \\ \text{av. of subject items} \times \text{tot. of relative items} \end{array}}{\sqrt{\begin{array}{c} \text{Sum of squares of sub. items} \\ \text{minus} \\ \text{av.} \times \text{total of these items} \end{array} \times \begin{array}{c} \text{Sum of squares of rel. items} \\ \text{minus} \\ \text{av.} \times \text{total of these items} \end{array}}}$$

The computations are shown in the accompanying tabulation in which "S," "R," and "T" stand for "subject," "relative," and "total" respectively. The letter "f" means "frequencies" and refers to the entries in the body of the table. The figures in the columns and rows at the right and bottom of the table give the operations necessary for finding the coefficient of correlation, with the exception of the two lowest rows at the bottom which are separated from the others and which represent the operations necessary for finding the correlation ratio.

As the tabulation shows, the coefficient of correlation is 0.73. The next step is to find the correlation ratio. This is the ratio between two standard deviations of which the first is that of all the items of the subject series. Since the standard deviation is the square root of the average of the squares of the deviations of the numbers of a series away from their own average, the first step is to find the sum of the squares of the deviations in the subject series.

This is 62 and it has already been found in computing the coefficient of correlation. It is equal to the sum of the squares of the subject series (678) minus the total times the average of that series [678 - (136 × 4.53) = 62].

The next step is to find the sum of the squares of the deviations of the averages of each column from the average of the entire subject series. This work can be greatly shortened by following the method utilized in finding the coefficient of correlation. That

Subject Values	Relative Values					T	ST	SST
	1	2	3	4	5			
2	3	1	.....	.....	.....	4	8	16
3	3	1	.....	.....	.....	4	12	36
4	3	2	.....	.....	.....	5	20	80
5	1	3	2	.....	.....	6	30	150
6	.....	2	3	3	3	11	66	396
T	10	9	5	3	3	30	136	678
RT	10	18	15	12	15	70	Av. of sub. items, $\frac{136}{30} = 4.53$	
RRT	10	36	45	48	75	214		
ΣSf	32	40	28	18	18		Av. of rel. items, $\frac{70}{30} = 2.33$	
R(ΣSf)	32	80	84	72	90	358		
(ΣSf) <sup>2</sup>	1,024	1,600	784	324	324			
$\frac{(\Sigma S f)^2}{T}$	102.4	177.8	156.8	108	108	653		

$$70 \times 4.53 = 317$$

$$136 \times 4.53 = 616$$

$$70 \times 2.33 = 163$$

$$358 - 317 = 41$$

$$678 - 616 = 62$$

$$214 - 163 = 51$$

$$r = \frac{41}{\sqrt{62 \times 51}} = \frac{41}{\sqrt{3,162}} = \frac{41}{56.23} = 0.73$$

method is based on the principle that the sum of the squares of the deviations of a series away from its average is equal to the sum of the squares of the numbers in the series, minus the product of the total of the series and its average.

Following the same principle we find the sum of the squares of the deviations of the averages of the columns away from the average of the whole subject series. The first step is to find for each column the square of its average multiplied by, or weighted

by, the number of cases in the column. In symbols the desired figure for each column is equal to  $\frac{\Sigma Sf}{n} \times \frac{\Sigma Sf}{n} \times \frac{n}{I}$ , which is equal to  $\frac{(\Sigma Sf)^2}{n}$ .

In finding the coefficient of correlation we have already found  $\Sigma Sf$  for each column, so the new operations may be performed by squaring these numbers and dividing the result by the number of cases. This is done in the two added rows below the table. Thus, in the third column of the table the entries are 2 and 3 and they correspond to the values 5 and 6. The sum of the subject values times their frequencies ( $\Sigma Sf$ ) is then  $(2 \times 5)$  plus  $(3 \times 6)$  or 28. In the next to the last row this number is squared and in the last it is divided by the number of cases (5) giving a result of 156.8, which is the square of the average of the values of the column weighted by the number of cases. This may be verified by noting that the sum of the values of the column is  $(2 \times 5)$  plus  $(3 \times 6) = 28$  and their average  $28/5$ . This squared is 31.36, which weighted by the number of cases (5) equals 156.8.

The total of this last row of weighted squares of averages is 653. From this we get the sum of the squares of the deviations from the averages of all the subject values in the table by subtracting the product of the sum of the subject series and its average or  $(136 \times 4.53 = 616)$  which gives 37.

Probably the best way for the reader to convince himself that this method is valid and to find out why it is valid is to experiment with simple illustrative cases, carrying the work through by the standard method as described by Rugg and by this method.

We now have two numbers, 62 and 37, which are the sums of squares of deviations and from them we must find the two standard deviations and the ratio between them which will be the correlation ratio. The work is as follows:

$$\eta = \frac{\sqrt{\frac{37}{30}}}{\sqrt{\frac{62}{30}}} = \frac{\sqrt{37}}{\sqrt{62}} = \frac{6.083}{7.874} = 0.77$$

Instead of dividing 37 and 62 by 30 before finding the square roots it is better to eliminate the two 30's. This shortens the work and does not change the relationship between the numerator and denominator.

The correlation ratio is 0.77 whereas the coefficient of correlation is 0.73. The difference is frequently much greater than it is here. The added work necessary to find the correlation ratio is slight. It consists for the most part in the two added lines of figures at the bottom of the table which are easy to get because they are derived from the other computations of the rows above them which have already been used in computing the coefficient of correlation.

There are two correlation ratios for each table of distribution, just as there are two coefficients of regression for each coefficient of correlation. In the case here given the other correlation ratio would be found by working with the relative series and the rows of numbers in the original table instead of with the subject numbers and the columns. The added columns of figures would be at the right of the main table instead of at the bottom. Generally the two correlation ratios are nearly identical so that it is not necessary to find both of them.

Following the method described, the formula for the correlation ratio becomes

$$\eta = \frac{\sigma_{AS}}{\sigma_S}$$

in which the subscript *AS* indicates that the numerator of the fraction is the standard deviation of the averages of the subject values in each column from the average of all the subject values, and the subscript *S* indicates that the denominator is the standard deviation of all the subject values in the table.

# PUBLICITY CAMPAIGNS FOR BETTER SCHOOL SUPPORT

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## I. THE PROBLEM

The most casual observer of the efforts to secure better school support in this critical period cannot but note the emphasis placed upon publicity campaigns or "drives." This emphasis is no accidental or temporary affair. In the first place, the public schools have been forced to compete with ever increasing taxes for other purposes. Demands for better highways, improved sanitation, increased protection to life and property, and increased state and governmental service in various directions have all tended to raise taxes and to make it relatively more difficult to secure the necessary school expenditures. In the second place, the standards of school service of today are much higher than formerly. Improved school buildings, more highly trained teachers, enriched curricula and a longer school term require more money than did the school programs of a few decades ago. Again, during the war period citizens became so accustomed to drives for large sums of money that any cause which does not now conduct a drive is almost certain to seem trivial or unimportant to them. Increased taxes and rising costs of living have combined to make taxpayers even more reluctant to increase school expenditures. In many places schools are now running up to the full tax levies which are legally possible without a direct vote of the people for an increase. There is probably not one school system in a hundred where the people can be induced to vote increased school taxes for the amount now needed, without a well-directed and vigorous campaign of publicity.

Such being the case, our problem is to discover the principles and procedures underlying the organization and operation of successful school publicity campaigns. How can their success be insured? More particularly, what should be the form of organization? How ought the constituency to be analyzed for points

of possible contact? What avenues and instruments of approach to the public can be utilized? How should arguments and illustrations that will really convince the voters be selected? How should publicity material be prepared and circulated to be most effective? These are questions which this investigation seeks to answer.

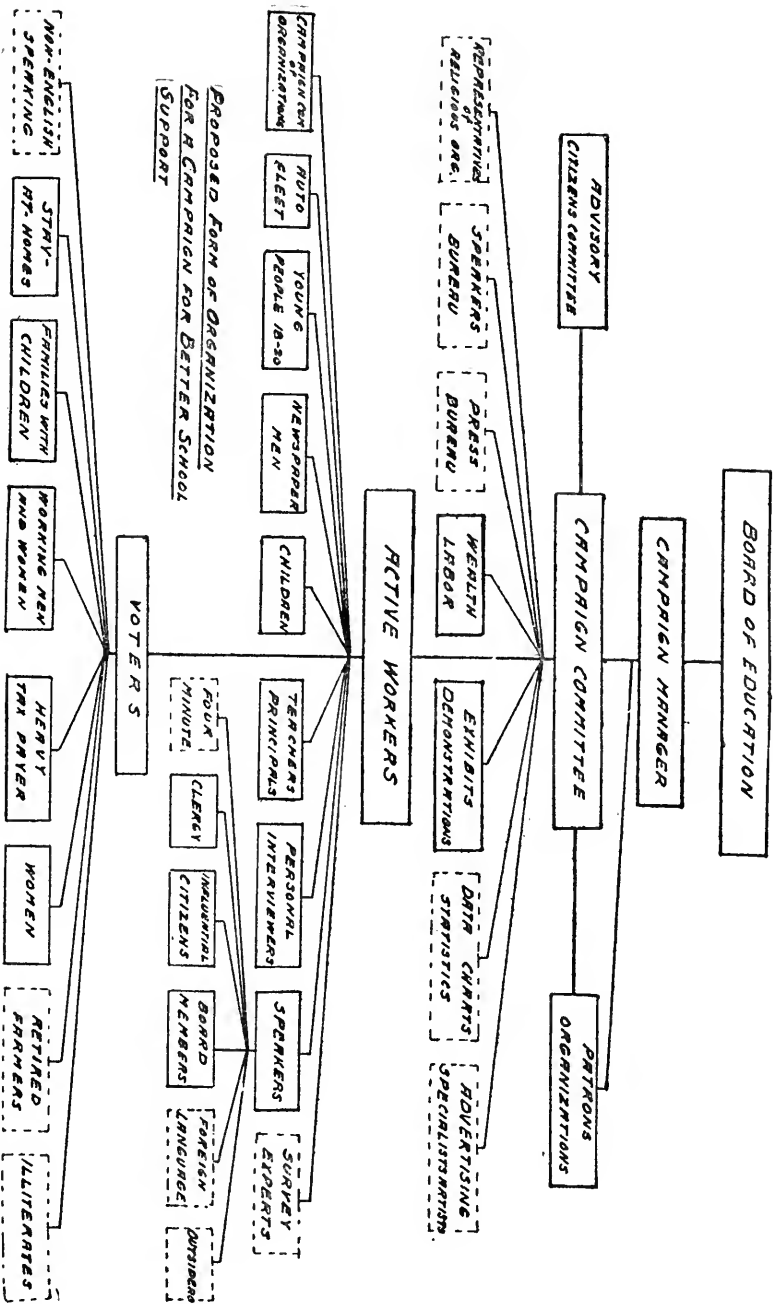
## II. THE METHOD

In this study we have attempted to follow the accepted procedure for matters involving as much social psychology as do publicity campaigns. This method is to analyze the work of successful men with a view to discovering the secrets of their successes and to formulating rules for achieving similar ones by other men. Accordingly, we have sought the solution of our problem in a careful study of school campaigns that have actually succeeded. There is an art, a skill in generalship, an indefinable something in leaders in school campaigns, which needs to be carefully analyzed and made available for other school men.

To secure accounts of publicity campaigns, a letter was addressed to superintendents in cities in various parts of the United States wherever it could be learned that such methods had been successfully employed.<sup>1</sup> The letter, which briefly explained the purpose of the study, contained a request for a careful description of the methods employed and copies of material used. A suggestive list of typical situations on which information regarding publicity methods was being sought was inclosed with the letter.

More than seventy superintendents representing various parts of the country and cities of all sizes responded generously. Most of them described the significant phases of the campaign in their own community and many sent printed or mimeographed materials that had been used. In several instances follow-up letters were written to secure specific details. Wherever opportunity was afforded through educational gatherings of various kinds personal interviews were held. The data thus gathered represented every general condition. The writers have studied the

<sup>1</sup>In this connection the writers are indebted to several members of the National Association of Directors of Educational Research for supplying information as to cities in their own states that had recently passed through a campaign. Dr. B. R. Buckingham furnished data for Illinois, Dr. E. J. Ashbaugh for Iowa, Dean F. J. Kelly for Kansas, and Dr. W. W. Phelan for Oklahoma.



accumulated evidence with considerable care and from it have reached the conclusions set forth in this article.

### III. THE RESULTS

In a study of this nature it is impossible to present the results in the ways that would be possible in a purely statistical investigation. Our presentation will therefore be of a descriptive nature. Again the bare results without the illustrations and data from which they are derived cannot carry the whole story. For that reason it has seemed advisable in this article to present only a brief sketch of the findings and conclusions. We have included a diagrammatic representation of the form of organization desirable for a successful publicity campaign, a composite of the best features of all the campaigns studied, and brief notes on some additional aspects of the problem of securing better school support. The complete results of the study will be embodied in a printed bulletin shortly to be issued by the Wisconsin State Department of Public Instruction.

The accompanying chart presents a proposed form of organization for the administration of a school publicity campaign. An organization of this sort must of necessity be highly centralized and the various parts properly coordinated. The nature of the campaign committee proper, with its various subcommittees, the various kinds of active workers, together with the working relations of various parts of the entire staff may be gleaned from an examination of the chart. In small communities only as much of the organization as is indicated by the solid lines may be necessary, but in large communities the complete organization seems advisable.

One cannot read the accounts of campaigns that succeeded and of campaigns that failed without becoming impressed with the necessity for reaching all parts of the public. This may be partly accomplished by having on the campaign committee representatives of various groups such as labor, capital, real estate interests, and religious organizations. Experience indicates that special effort should be made to reach the following: (1) *Illiterates* as distinguished from literates. (2) *Those unfamiliar with the English language* as distinguished from those able to read and understand it. (3) *Women*. Women are not so much inclined to



exercise their voting privileges to ward off increased taxes, as to secure improved school conditions. They can usually be enlisted for active, enthusiastic, and effective support. (4) *Heavy taxpayers.* This group includes the bankers, real estate owners, manufacturers, etc. Endorsements from those upon whom the burdens fall heaviest will have much weight. (5) *Retired farmers.* This group is an important one to consider in smaller communities because of its notorious opposition to high taxes. (6) *Families with children of school age* as opposed to families without children or with children beyond school age. Winning the support of the latter will be much more difficult. (7) *Workers who cannot leave their work* and who must be reached either going to and from their place of employment, or at it. (8) *Young people between the ages of 18 and 20* or thereabouts. They have such interests as athletics, gymnastics, night schools, and community center activities and become staunch supporters when properly approached. (9) *School children.* The pupils can be used to influence parents. It should be remembered also that they will later become the parents. Efforts made to train them for effective support will count also in campaigns to come.

For dealing with the various groups, the best procedure is to try to win as many active supporters in each group as possible. The greater the number of intelligent and aggressive supporters that can be won, the greater will be the chances of success with the rank and file in that group. Proper timing of the campaign so as to fit in with campaigns for other purposes is often essential to secure the support of certain influential groups.

The fundamental principles for the selection of arguments and illustrations in the campaigns appear to be these:

1. Build all on the proposition that the people of the community wish to do the right thing by the children and that they will make any necessary sacrifices to this end if needs are clearly and forcibly shown.

2. Make the good of the children the paramount issue, in particular subordinating all considerations of cost to it.

3. Let the school authorities appear to be speaking for the whole people on school matters and not in the interests of any special class.

Other good rules for the selection of arguments and illustrations may be stated thus: (1) Follow the principles of good argumentation. (2) Establish confidence in the schools by showing their accomplishments. (3) Present actual facts that form the basis for present needs. (4) Bring out clearly what the new program will accomplish. (5) Secure public endorsements by leaders. (6) Treat proposed costs and the ability of the community fairly, and at the psychological moment. (7) Make a list of all possible objections and alternative propositions; have a sound and dignified rebuttal for each.

It is fully as important to prepare and circulate the publicity material properly after it is selected as it is to select good arguments and illustrations in the first place. But by far the best way to learn how to prepare the *form* of the publicity material, is to examine carefully samples of effective school publicity, with a view to imitating or reproducing them for one's own school system. Space forbids any attempt on our part, however, to present such samples here. It would be as futile for us even to try to summarize the work of preparation in a few words, as it would be to tell a person in a sentence how to be "interesting." Any treatment of this phase of the study that is to be of real service to the reader must contain abundant examples and illustrations from actual campaigns. For material of this sort the reader is accordingly referred to the forthcoming bulletin of the Wisconsin State Department of Public Instruction previously mentioned.

#### IV. A COMPOSITE PROGRAM

To save the busy superintendent time and effort, it has seemed advisable to map out a composite campaign with steps in chronological order, embodying the best methods of all the successful campaigns studied. In his own campaign the superintendent should strive to produce a cumulative effect with his arguments, illustrations, and citations of fact. For complete layouts of campaigns extending over several months Lincoln, Nebraska and Denver, Colorado furnish good examples.

The treatment of the composite campaign is given under three heads with the steps under each indicated in chronological order.

I. The general publicity campaign (lasting from six months to

several years depending upon circumstances). II. The drive (a month or more). III. Additional work necessary to insure that the increase will actually be carried at the polls, wherever the question is submitted to popular vote.

### I. THE GENERAL PUBLICITY CAMPAIGN

1. The general plans having been laid, the director and the managing committee start the discussion of school needs, preferably at a mass meeting.

2. The worth of the schools is constantly stressed; when defects must be noted, the cause is clearly shown to be mainly a lack of sufficient funds.

3. By all possible means the discussion is kept up.

4. By a survey, personal investigation on the part of citizens, and skillful comparisons, a growing conviction that something must be done, is induced.

5. The discussion is gradually directed toward a demand for a specific plan for betterment.

6. The director has the specific plan ready and when things are favorable, has it proposed by suitable sponsors.

7. All along the teaching staff have been given a sort of a "know your own schools" or a "war aims" course on the needs of the school system and the plans for the campaign. Thus as soon as the drive starts, the teachers will be ready to answer promptly and satisfactorily inquiries about school work and to serve as radiating centers for sentiment favorable to increased school support.

### II. THE DRIVE

1. The definite proposal is published, approval secured from every possible reputable organization in the city, from state department supervisors, university specialists on educational problems, school survey experts, etc.

2. The press comments favorably in editorials and runs school news in prominent places.

3. Exhibits, demonstrations, and entertainments, all duly advertised, show the work of the school.

4. Favorable interviews with all types of influential citizens appear at intervals in such fashion that the effect is cumulative.

5. News of what similar cities have done for their schools appears prominently in the papers, with all superior achievements featured.

6. Children carry to every home in town letters, circulars, and booklets explaining the proposal for increased expense, much of which material they have helped to prepare so that their parents are already greatly interested.

7. Advertisements for the school, contributed by merchants, begin and continue, increasing in size, numbers, and force.

8. At least one representative in every organization in town is listening for every note of opposition. As soon as this is reported, the rebuttal is promptly circulated where it will do the most good.

9. A poll may be taken and all favorable results published.

10. Addresses are given before every organization and at practically every general meeting, especially talks by four-minute men and children.

The talks for the latter have been prepared in school so that the parents are already interested.

11. Cartoons, special articles, and slogans appear in printed material.

12. Posters, placards, and exhibits of school work are put up in store windows, the post office, etc. Handbills and dodgers are distributed to every home.

13. Advertisements are placed on delivery wagons, vans, street cars, etc.

14. Slides are prepared for moving picture houses.

15. Specific directions for voting in favor of the issue are circulated, preferably with a picture of a ballot correctly marked and stressing the date. These are printed in papers, put on movie slides and handed around on circulars.

16. Special arrangements are made to reach factory workers at the noon hour or while they are going to and from work.

17. The Sunday before voting day every minister preaches a sermon favoring the proposition.

18. A few days before the vote, each child in school writes a letter to a relative or personal friend who is practically certain to come out to vote. If the child is working under poor school conditions, the voter is asked to vote to help this particular child to secure better schooling. If the child has a good school, the voter is asked to vote to give other children who are not so fortunate, an equal chance.

19. The day before the voting, a monster parade of school children, teachers, the board of education, and all prominent individuals and organizations supporting the measure, takes place. The object of this is to make an opponent realize that he is fighting the whole community.

20. On voting day, tags are pinned on those who have voted favorably, announcing the fact.

### III. ADDITIONAL WORK NECESSARY TO INSURE THAT THE DESIRED INCREASE WILL ACTUALLY BE VOTED AT THE POLLS .

1. A complete card catalog of voters is made up through children and teachers or taken by post card, showing the way citizens will vote.

a. Those against the measure are approached, care being taken to change their views by every legitimate means.

b. When prominent converts are made, sufficient publicity is given the fact. .

c. Publicity is given to anything indicating that there will be a majority vote for the proposition.

2. There must be a good organization to get out the vote on election day.

a. An automobile fleet, under a competent director to bring voters to the polls, is run by high-school boys, club women and if possible by leading business and professional men.

b. Special effort is made to get the stay-at-home voters or those who cannot easily spare the time to go to the polls.

c. Arrangements are made for high-school girls to stay with children and sick people so that every woman possible can cast her vote. This vote will practically always be for better school support.

## THE OVERLAPPING IN THE CONTENT OF FIFTEEN SECOND READERS<sup>1</sup>

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A few decades ago, practically all instruction in reading in any grade was confined to the single text selected for that particular grade. The common method of procedure was either to read a selection over and over before taking up a new one thus spending the whole year on one book, or to complete the book and spend the remainder of the year in re-reading it—often reading a book as many as five or six times. The prevailing idea underlying such practice was that constant repetition of the same subject matter made permanent the vocabulary and gave ability to interpret the printed page. With the advent of the present decade with its emphasis on social needs, economy of time, and superior methods, this practice of confining the attention to a single book is subject to much criticism. It is not denied that repetition of vocabulary is needed to guarantee mastery over it, but it is contended that greater mastery is obtained by meeting the words in many different situations than by meeting them many times in the same situation. Furthermore, reading is the key to the complete understanding of the complex social life in which we live. Adequate training in it demands a subject matter so broad and so varied as to furnish introduction to the many lines of activity in present day life. Such a training, therefore, necessitates the mastery of the reading process through extensive rather than through narrow intensive reading.

Improved methods of teaching reading involving motivation emphasize this same plea for extensive reading. Such a plea urges that constant repetition of the same subject matter deadens the interest and makes the reading process more mechanical and much less effective than repetition of the same vocabulary in different stories which may be read with the interest always at the highest possible level.

<sup>1</sup> All tabulations quoted in this article are taken from a master's thesis presented at the University of Washington by Ralph E. Stone. The author is indebted to Mr. Stone for the privilege of publishing them.

Simultaneously with these demands for an extensive and varied subject matter there comes upon the market an enormous supply of readers. Some are intended solely for supplementary purposes while others are intended for regular class texts, but advertised as also useful for supplementary reading. Each year thousands and thousands of dollars are spent in providing the schools with such materials. While no one questions the wisdom of an ample supply of supplementary readers, it is contended that many of these readers have been blindly and unscientifically selected and that too often readers selected for supplementary purposes contain the same stories as the basal texts.

In order to throw some light on the overlapping in the contents of second readers and to secure a few facts to aid in the selection of supplementary texts, a study involving the critical analysis of the contents of fifteen second readers was made. The titles of the books together with the names of the authors, and the dates of publication are presented in Table I.

TABLE I. TITLES OF THE FIFTEEN BOOKS SELECTED WITH  
THEIR AUTHORS AND DATES OF PUBLICATION

Title	Author	Date
Literary.....	Young and Field.....	1916
Aldine.....	Spalding and Brice.....	1907
Edson-Laing.....	Edson and Laing.....	1916
Progressive.....	Burchill, Ettinger, and Shimer.....	1909
Carroll and Brooks.....	Carroll and Brooks.....	1912
Baldwin and Bender.....	Baldwin and Bender.....	1911
Rational.....	Ward.....	1896
Riverside.....	Van Sickle and Seegmiller.....	1911
Elson.....	Elson.....	1913
Classic.....	Norvell and Haliburton.....	1901
Golden Treasury.....	Stebbins and Coolidge.....	1909
Beacon.....	Fassett.....	1914
Nature and Life.....	Smith.....	1910
Cyr.....	Cyr.....	1904
New Education.....	Demarest and Van Sickle.....	1901

The list of books was arbitrarily chosen but an attempt was made to select those that are widely used at the present time.

One familiar with second-grade work will recognize both the "content" and the "method" type of readers. The date of publication shows that the Rational, published in 1896, is the oldest of the books considered and that the Literary and the Edson-Laing, published in 1916, are the newest. No one of the books is intended primarily for supplementary purposes, but current practice shows that any one of them is apt to be used as a supplementary text, many classrooms having five or six sets.

### THE OVERLAPPING IN TYPES OF LITERATURE

The first phase of our problem represents an attempt to classify the contents of the different readers according to the different types of literature contained. Of course such an attempt is arbitrary but the writer is convinced that the results secured are amply reliable to show the tendency in each book.

Most of the types of literature mentioned in Table II are self-explanatory, but for the convenience of the reader, it might be well to explain what was included in such closely related types as folklore, myths, fables, and fairy stories. Folklore includes tales and legends of the Norse, English, and Scotch, as well as stories from the Grimm brothers and Joel Chandler Harris. Myths include only those selections that attempt to explain contemporary phenomena by the narrated occurrence; fables, those selections of Aesop and a few others whose purpose was to reflect the foibles and frailties of human nature; fairy stories, those in which fairies or other benevolent spirits dominate the situation.

Table II, representing the percent of each book devoted to the various types of literature, shows that the books differ a great deal in the nature of their content. Probably the greatest value of this table is to give a bird's eye view of the books, and to aid in choosing a supplementary book which will emphasize different types of literature from those already represented in the basal readers. It is surprising that a majority of books devote a preponderance of space to such closely related fields as folklore, fables, fairy stories, and myths, and a meager amount of space to stories involving boys and girls, birds, plants, pets, fowls, plays and games. It would seem at once that the primary basis for appealing to the interest of the child has been the strange and the fanciful. This fact is brought out more plainly in Table III,





which represents an attempt to generalize upon the facts given in Table II, and to group the subject matter into two main classes, the instructive and the imaginative.

TABLE III. NUMBER AND PERCENT OF PAGES DEVOTED TO INSTRUCTIVE AND IMAGINATIVE MATERIALS

Readers	Total Pages Reading Material	Pages Instructive Material	Pages Imaginative Material	Percent Instructive Material	Percent Imaginative Material
Literary.....	154	17.0	137.0	11.0	88.9
Aldine.....	108	25.5	82.5	23.6	75.9
Edson-Laing.....	100	16.0	84.0	16.0	84.0
Progressive.....	121	0.0	121.0	0.0	100.0
Carroll and Brooks...	121	53.5	67.5	44.2	55.7
Rational.....	116	74.5	41.5	64.2	35.7
Baldwin and Bender.	122	82.0	40.0	67.2	32.7
Riverside.....	145	25.0	120.0	17.2	82.7
Elson.....	147	31.5	115.5	21.4	78.5
Classic.....	153	49.0	104.0	32.0	67.9
Golden Treasury.....	102	40.0	62.0	39.2	60.7
Beacon.....	132	40.0	92.0	30.3	69.6
Nature and Life.....	135	67.5	67.5	50.0	50.0
Cyr.....	101	101.0	0.0	100.0	0.0
New Education.....	121	51.0	70.0	42.1	57.8
Median.....	121	40.0	82.5	32.0	67.9
Range.....	100-154	0-101	0-137	0-100	0-100

A glance at Table III reveals great variation in the amount of the instructive and imaginative material contained. The Progressive goes to one extreme by including no instructive material and 100 percent imaginative material, while the Cyr represents the other extreme with 100 percent instructive and no imaginative. Between these extremes one can find almost any proportion that one desires. Of all the books considered, 32 percent of the total pages represents the median amount devoted to instructive material, while 67.9 percent is devoted to imaginative.

In this connection it is interesting to indicate that on the average 15.3 percent of the subject matter in the different books—

the amounts varying from 0 to 42.0 percent—is devoted to *real nature stories*; while 51.8 percent on the average—with amounts varying from 0 to 100 percent—is devoted to folklore, fairy tales, and myths. A reader often devotes much more space to *nature myths*, the imaginative, than to *true nature stories*, the instructive. It is true that children like to read nature myths, but it is equally true that they are hungry for real facts about nature. Do these facts not indicate a lack of balance between instructive and imaginative material? Do they not suggest a definite need for the publication of a new type of reader which emphasizes the right informational material?

#### DUPLICATION IN THE SELECTIONS THEMSELVES

The previous section indicates great duplication in the type of material composing the contents of the different readers. One can readily understand some of this duplication if he takes into consideration the duplication in the selections themselves.

Table IV, giving the different selections occurring in at least three readers and the readers in which they occur, shows a rather surprising amount of overlapping. "Over in the Meadow" is found in the Edson-Laing, Carroll and Brooks, Rational, Baldwin and Bender, Classic, Golden Treasury, and Beacon readers. "The Four Friends," better known as "The Town Musicians," is found in the Progressive, Carroll and Brooks, Rational, Riverside, Beacon, and New Education readers. The last column in the table summarizing the number of readers containing each selection shows that one selection occurs in seven readers, one selection in six readers, one selection in five readers, six selections in four readers, and fifteen selections in three readers. A table similar to this one but not included in this article for want of space shows that 53 selections occur in two different readers. In the fifteen readers examined, 77 selections are repeated in from two to seven books.

The real significance of this overlapping is better set forth in Table V which gives the exact number of pages of duplicated material in any two of the books. To read this table always begin at the left. The figures opposite each book at the left indicate the number of pages in that book devoted to the same subject matter contained in each of the readers shown at the tops of the columns. For example, the Literary reader devotes 3.5 pages to material contained in the Aldine reader, 1.5 pages to material

TABLE IV. SELECTIONS OCCURRING IN AT LEAST THREE READERS AND THE READERS IN WHICH THEY OCCUR

Selections	Literary	Aldine	Edson-Laing	Progressive	Carroll and Brooks	Rational	Baldwin and Bender	Riverside	Elson	Classic	Golden Treasury	Beacon	Nature and Life	Cyr	New Education	No. of Times Occurring in Readers
Over in the Meadow.....	..	..	x	..	x	x	x	..	..	x	x	x	..	..	..	7
The Four Friends.....	..	..	..	x	x	x	..	x	..	x	..	x	..	..	x	6
The Three Billy Goats.....	..	..	..	x	x	..	x	x	..	x	..	x	..	..	..	5
The Bell of Auri.....	..	..	..	..	..	..	..	..	x	..	x	..	..	..	..	4
The Lion and the Mouse.....	x	..	x	..	x	x	..	..	..	..	..	..	..	..	..	4
The Swallow.....	x	..	..	..	..	..	x	x	x	..	..	..	..	..	..	4
The Swing.....	..	..	..	..	..	..	x	..	..	x	x	..	..	..	..	4
The Wind and the Sun.....	x	..	..	..	x	x	..	..	..	..	x	..	..	..	x	4
The Ugly Duckling.....	..	..	x	x	..	..	..	..	..	..	x	..	..	..	..	4
My Shadow.....	..	..	..	..	..	..	x	..	x	..	x	..	..	..	..	3
Little Birdie.....	..	..	x	..	..	..	..	..	..	..	..	..	..	..	..	3
How to Build a Nest.....	..	x	x	..	..	x	..	..	x	..	x	..	..	..	..	3
The New Moon.....	..	..	..	..	..	..	..	..	..	..	x	..	..	..	..	3
Sleep, Baby, Sleep.....	x	x	..	..	..	..	..	x	..	..	..	..	..	..	..	3
Clovers.....	..	..	..	..	..	..	..	..	x	x	..	..	..	..	..	3
Daisies.....	x	..	..	..	..	..	..	..	..	x	..	..	..	..	..	3
Sour Grapes.....	x	..	..	..	x	..	..	..	..	..	..	..	..	..	x	3
The Dog in the Manger.....	..	..	..	..	..	..	..	x	..	..	x	..	..	..	x	3
The Rain.....	..	x	..	..	..	..	x	..	..	..	..	..	x	x	x	3
Belling the Cat.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
Who Stole the Bird's Nest?.....	..	..	..	..	..	..	x	..	..	x	..	..	..	..	..	3
Little Red Riding Hood.....	..	..	..	x	..	..	..	..	..	..	..	..	..	..	x	3
Whittington and His Cat.....	..	..	..	..	..	x	..	..	..	..	..	x	..	..	x	3
The Little Red Hen.....	..	..	..	..	x	x	..	..	..	..	..	x	..	..	x	3

TABLE V. PAGES DEVOTED TO DUPLICATED MATERIALS IN THE DIFFERENT READERS

Reader	Literary	Aldine	Edson-Laing	Progressive	Carroll and Brooks	Rational	Baldwin and Bender	Riverside	Elson	Classic	Golden Treasury	Beacon	Nature and Life	Cyr	New Education
Literary.....		3.5	1.5	3.0	7.0	3.0	0.5	1.5	1.5	6.5	0.0	0.0	0.0	0.0	5.5
Aldine.....	2.5		4.5	0.0	0.0	0.0	1.0	0.5	4.5	1.0	0.0	0.0	9.0	0.0	5.0
Edson-Laing.....	1.0	2.0		7.0	8.0	5.0	1.5	7.0	2.5	4.5	9.5	3.0	0.0	0.0	11.5
Progressive.....	5.5	0.0	7.0		14.5	19.0	11.5	14.5	0.0	5.5	7.0	9.0	0.0	0.0	30.0
Carroll and Brooks.....	7.5	0.0	6.0	10.5		17.8	7.3	10.5	2.5	13.3	2.8	11.3	0.0	0.0	12.5
Rational.....	5.0	0.0	7.0	6.5	15.5		5.5	4.0	0.0	3.0	3.5	16.0	0.0	0.0	14.5
Baldwin and Bender.....	0.5	1.0	2.5	10.5	9.5	6.5		7.5	1.0	10.5	7.0	2.5	3.5	0.0	6.0
Riverside.....	1.0	0.5	6.0	11.5	11.5	7.0	7.0		1.0	4.5	0.0	7.0	0.0	0.0	7.5
Elson.....	1.8	1.5	2.5	0.0	3.0	0.0	3.0	1.5		18.8	8.5	6.0	2.5	0.0	3.5
Classic.....	6.0	1.0	3.5	4.5	12.5	4.0	11.5	4.5	17.0		8.5	18.5	3.0	0.0	0.0
Golden Treasury.....	0.0	0.0	22.0	20.0	4.5	3.5	7.5	0.0	8.0	7.0		8.0	2.5	0.0	20.0
Beacon.....	0.0	0.0	15.5	9.8	17.8	29.8	2.5	9.8	4.3	17.5	7.5		0.0	0.0	18.3
Nature and Life.....	0.0	14.5	0.0	0.0	0.0	0.0	5.5	0.0	3.8	4.5	2.0	0.0		0.0	9.5
Cyr.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
New Education.....	3.0	0.8	8.0	16.0	7.0	14.3	5.5	5.0	3.0	0.0	5.0	8.3	3.5	0.0	

NOTE: Read this table from the left when finding number of pages of duplicated matter.

contained in the Edson-Laing, etc. The presence of small numbers in these columns indicates little overlapping in any two readers, but the presence of large numbers indicates much overlapping.

Table V shows that the Cyr reader has a subject matter entirely its own and does not overlap at all with any of the other 14 readers. Such a statement cannot be made concerning the other readers. In certain cases from one-third to one-half of the contents of one reader can be duplicated without consulting more than two or three readers. To illustrate, the Progressive reader devotes 14.5 pages to subject matter occurring in the Carroll and Brooks reader and the same number of pages to subject matter contained in the Riverside reader. It includes 19 pages of material found in the Rational reader, and 30 pages of material found in the New Education reader. Again, the Golden Treasury reader devotes 22 pages to subject matter occurring in the Edson-Laing reader, 20 pages to subject matter occurring in the Progressive reader, and 20 pages to subject matter occurring in the New Education reader. Do not these facts suggest the possibility of waste in the purchase of supplementary readers?<sup>2</sup>

In indicating this overlapping it is not contended that children should not read and re-read the same selections for indeed they clamor for certain selections and seem never to tire of them. It is poor economy, however, both from the standpoint of the money involved and from the standpoint of introducing the child to the activities of life's complex environment to buy a supplementary reader which extensively duplicates the material already contained in the basal reader.

As stated above, children should re-read stories and they call ardently for their favorite selections, but they want exact repetitions and not abridged or modified versions in another book. Better practice, from the standpoint of modern theories of education, would be to utilize the same words in different stories involving various aspects of the social environment of the child,

<sup>2</sup> In pointing out the amount of overlapping, no consideration has been given to the date of publication of the different readers, nor has any attempt been made to account for the cause of the overlapping. The situation has been portrayed as it is in the hope that superintendents and teachers will be more careful in the selection of their supplementary readers.

rather than to use the same words in different versions of the same story. Such a practice would eliminate the duplication of selections.

#### SUGGESTIONS FOR AVOIDANCE OF DUPLICATION

The facts presented in the previous sections indicate two well-defined tendencies: first, that of employing the imaginative type of literature; and, second, that of repeating the same selections in the various readers. However, with a little precaution in the selection of the basal and supplementary readers, any undesirable effects of these tendencies may be avoided.

If the basal reader is one which emphasizes the imaginative material as indicated in Table III (or through similar analysis of other books), the selection of supplementary readers emphasizing instructive material—i.e., biography, history, true stories of plants, animals, boys, and girls, etc.—would furnish variety in the types of reading materials and would harmonize with the social interpretation of education.

Reference to Tables IV and V would facilitate a choice of books without duplication of the selections themselves. To illustrate, suppose the Literary reader is the basic text and a supplementary text is to be chosen. Table III shows that 88.9 percent of the content of the Literary reader is of the imaginative type—the particular form of which can be found in Table II if desired. Obviously, if one accepts the social theory of education, the supplementary book should be of the informational type. From Table III it is seen that four readers—Rational, Baldwin and Bender, Nature and Life, and Cyr—contain more than 50 percent instructive material. Table V shows that little or no duplication exists between the Literary reader and any of these books, and consequently any one of them would make a good companion book so far as subject matter is concerned. It is evident that such comparisons become of more value as the number of readers, supplementary, companion, or basal increases.

The above tables suggest a method of analysis which should prove helpful. Until some such method is followed school people will continue to select books unscientifically and to deprive the children of reading matter of sufficient variety to introduce them to the complexities of the social life with which they are surrounded.

# WHAT FIRST-GRADE CHILDREN CAN DO IN SCHOOL AS RELATED TO WHAT IS SHOWN BY MENTAL TESTS

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For the past three years, mental testing has been carried on extensively with first-grade children at Oakland. It has been discovered that a very high percentage of those who test below six years, mentally, fail to do the work which has been set up as standard for first-grade pupils. It was decided in August, 1918, to conduct an experiment by segregating some of our first-grade classes, using the results of the mental test as the chief basis for grouping. Two schools were selected where there were large numbers of first-grade pupils reported by the teachers as serious problems for education. We shall refer to these schools as School A and School B. Both schools are situated in a manufacturing, water-front district where the social conditions are among the least desirable of the city. According to a recent survey, 15 percent of all children attending School A are foreign born; 65 percent of the fathers and 61 percent of the mothers are foreign born, chiefly Austrian, Italian, and Portuguese. Of the children attending School B, 15 percent are foreign born; while 65 percent of the fathers and 57 percent of the mothers are foreign born. Here, the Portuguese element predominates.

In School A, the children of the low-first grade were segregated in three groups:

1. The borderzone group (I. Q.<sup>1</sup> 85 or below).
2. A group slightly better, either because of higher mental age or higher I. Q., but still below normal. This, we called the dull normal group.
3. The normal group, plus a few who tested superior.

In each of these groups a few shifts were made up or down on the basis of the school experience of the individual child. Some

<sup>1</sup> I. Q. refers to the "intelligence quotient" and is the ratio between mental age and actual or chronological age.

Children with I. Q. below 70 (mental age more than 30 percent below actual age) are likely to be feeble-minded, those with I. Q. between 75 and 85 ordinarily do not class with the feeble-minded, but are decidedly dull. Strictly speaking, perhaps few who test as high as 80 should be classed as borderzone cases.

of the children had been in school only a short time and others had attended one, two, or three terms. The accompanying table shows data concerning the 25 children who were placed in the lowest group. This, we shall refer to as Group I, School A.

This table includes all the pupils in the low-first grade of School A who classified in the borderzone group, mentally. Eight of these pupils tested below 70 I. Q.; ten, 70 to 79 inclusive; and seven, 80 to 87 inclusive. At the time the experiment began (August, 1918) three of the children were in the three-year mental age group, nine were in the four-year mental age group, twelve in the five-year mental age group, and one in the six-year mental age group. In chronological age, fourteen are now between seven and eight years, eight are between eight and nine years, and three between nine and ten years.

Considering the fathers of these children, eleven were born in Portugal, five in Italy, three in Austria, two in Assyria, one in Spain, one in Greece, one in England, and one in the Balkan States. Of the mothers, eight were born in Portugal, one in Honolulu (Portuguese), five in Italy, three in Austria, two in Assyria, one in Spain, three in the United States (all foreign, by nationality), one in Russia, and one in the Balkan States. From this, it will be observed that our problem involves a foreign element entirely. However all of the children spoke English rather freely at school prior to the time the segregation was made.

The social status as indicated by the occupations of the fathers is as follows: five were laborers in the ship yards; eight, laborers in the railroad shops; three, laborers on ferry boats; three, teamsters; five, day laborers; one, vegetable vender.

A strong primary teacher who was interested in this group of children was given the class. She was allowed freedom in method and equipment and told to do the best she could to educate these children. She has labored faithfully for a whole year, plus about three-fourths of the present term, with the result that only six of the 25 children can now read in an easy primer, and these do not read quite as well as the pupils in the normal class of the same school who began work this term. This statement regarding reading ability is based on an individual test for speed and accuracy in naming words in an easy primer not formerly used by the pupils. The reading of these 25 children was compared with that of twenty children who tested in the normal



## GROUP I, SCHOOL A

Child's Number	Intelligence Quotient	Present Age (Nov. 1, 1919)	No. of Terms in School Prior to Present
1	2	3	4
1	78	8-7 <sup>a</sup>	3
2	59	9-1	4
3	80	8-4	3
4	80	8-2	3
5	71	7-11	3
6	59	7-4	2
7	87	7-3	2
8	79	7-10	2
9	77	7-7	2
10	75	7-6	2
11	62	9-7	4
12	68	7-5	2
13	83	7-4	2
14	66	8-1	3
15	63	8-3	4
16	71	7-9	3
17	75	9-5	2
18	85	7-8	2
19	59	8-8	4
20	78	7-8	2
21	62	8-7	4
22	85	7-11	2
23	76	8-3	2
24	79	7-10	3
25	81	7-1	2

<sup>a</sup> 8-7 means eight years, seven months.

group and who had attended the first grade for only three-fourths of a term. The six pupils who have learned to read fairly well are numbers 1, 4, 5, 9, 15, and 23. Numbers 1, 4, and 5 have spent three terms each in school prior to the beginning of this term; numbers 9 and 23 have spent two terms prior to the present, and number 15 has spent four terms.

According to the teacher's judgment, these six children are the only ones of this group who now have approximately the capacity

for first-grade work. These, she believes, would not long keep pace if put in a class with normal first-grade children. They are slower than normal children and require much more drill in order to fix the work they are learning.

Space in this article will not permit detailed treatment of the data in each of the other groups. Group II, School A, was composed of 29 children who tested better than those in Group I or who showed slightly better adaptability for school work. They were considered the dull normal group. Sixteen tested in the five-year mental age group; three, in the four-year mental age group; and ten, in the six-year mental age group. The I. Q. range was from 75 to 95. This group was placed in charge of a good primary teacher, who was likewise instructed to educate these children the best she could, using great freedom in method and course of study. Six of this group had previously attended the first grade one term, eight, two terms, and two, three terms. The children have now completed two and three quarters terms of work since this experiment began, and only seven of the group have succeeded in learning to read approximately as well as the average pupil in the normal class in the high-first grade. The others can name words, but cannot do independent reading in an unfamiliar but easy first reader. Not one is considered by the teacher of this division to be able to do the standard work in a regular class of high-first grade children.

Group III of children in School A was composed of those who tested normal or above. There were 42 in this class and all but five of them passed the work of the regular first grade at the end of the term. The teacher attributed the failure of four of these to irregular attendance and of one to excessive timidity.

In School B, thirty of the pupils who tested below six years mentally and who classified in the dull normal group or below were placed in a special first-grade division. Of these, fourteen were repeating the work of the first grade, ten having been in school two terms, and four, one term. The teacher of this class was instructed to do work that was as near as possible the standard for the first grade. At the end of two terms of work under the experiment, two pupils out of the thirty were promoted into the high-first-grade regular class. Now, near the end of the third term, the teacher reports five more ready for high-first-grade work. The rest are not yet ready to be put into such a class.

Each of the three groups testing below normal has been assigned to a special teacher who has remained with that group for one year and a half, and the plan is to have the group with the same teacher for a period of two years in order that the progress of the experiment may be consistent for that time.

The superintendent of schools has appointed a committee consisting of the supervisor of primary grades, the teachers involved in these divisions under experiment, and three other primary teachers to follow this experiment carefully and report.

The committee arrived at the following tentative conclusions at the end of the first year (June 20, 1919):

1. That children who test below six years, mentally, and who also show by classroom behavior that they are below average in mental alertness should be segregated near the beginning of the first grade into a special division not to exceed 25 in each group and that the regular first-grade work should not be attempted.

2. A course of study should be made, adapted to their needs.

3. These children should move up through grade work more slowly, probably, than normal children, but not so slowly as that they will become discouraged through lack of progress.

4. The daily program of the teacher should be sufficiently flexible to permit the development each day of the problems of most vital concern to the class on that day.

5. The next problem for the committee to attack is the making of a course of study suited to the needs of such pupils.

According to the teachers of the three classes of mentally retarded, the first problems in the education of these children involve the teaching of cleanliness, hygiene, social adaptability, property rights, and the removal of fear of corporal punishment. Particularly do they emphasize the fact that these children get so many knocks and blows from their associates on the street and in the home, that they become victims of an attitude of fear and distrust which is very hard to overcome in the classroom. The customary thing is for the child to shrink or dodge whenever the teacher or any one else approaches.

An effort has been made to teach as much as possible of reading and number work, and to increase the vocabulary through conversation, dramatization, story telling, games, and handwork. The children are very slow to comprehend, slow to act, and what seems to be learned one day is lost before the next. Memory

and retention seem very poor; therefore repetition and drill must be used more extensively than with normal children.

The policy proposed by the committee mentioned above is being gradually introduced into the schools of Oakland wherever the conditions permit, and the committee has been instructed by the superintendent to proceed in the development of a course of study for the first and second years of schooling which shall be adapted to the needs of children who show by test that they are mentally retarded and who also show by brief trial that they are unable to attack, successfully, the regular work of the first grade.

#### SUMMARY AND CONCLUSIONS

1. Mental tests of several hundred first-grade children have shown that mental age and I. Q. are important factors in revealing a child's chances for success in his school work.

2. Most children who fail in the first grade show mental ages below six years and I. Q.'s below normal.

3. An experiment covering a year and a half leads us to approve the plan of segregating pupils in the first grade according to mental capacity.

4. The individual mental test (Stanford Revision) is trustworthy in determining such segregation in almost all cases.

5. Children who test low are very slow to learn to read. They have little initiative. What they appear to learn one day is not retained to the next. Much drill and repetition are necessary. Their reading is marked by a tendency to name words without thought of the meaning.

6. A special course of study should be given to children who show serious mental retardation. They should be led up through their school course according to their capacities and needs rather than according to formal grade standards.

7. Segregation of those who are retarded should occur during the first term or at the end of the first term in school, after the child has been "exposed" to the regular work. (Some of our committee feel that the segregation should take place immediately after the child's entrance to school.)

8. Several hundred children in Oakland are now segregated into special groups according to mental capacity and the plan is being rapidly extended.

9. A committee is now at work arranging a course of study to meet the needs of retarded children in their first two school years.

# THE CAMPAIGN METHOD IN ELEMENTARY EDUCATION<sup>1</sup>

J. W. RICHARDSON

*Research Director, Hibbing, Minnesota*

The value of standardized tests for the purpose of checking up the results of classroom instruction are recognized by all of us. We also recognize that the method of using the tests has become somewhat "standardized." Briefly, supervisors and teachers value them as a basis of judgment respecting the accomplishment of a given task. If test results are high, all are satisfied. If they are low, word is passed to the teachers to emphasize this or that phase of their work a little more; and the teachers follow instructions. Let us not examine the character of this emphasis too closely. We all know what emphasizing a particular phase of a given subject means. Later the test is repeated, each teacher is raised or lowered in rank according to the findings, and the incident is closed.

## NATURE OF THE CAMPAIGN METHOD

But what of that other great class of school people? I refer to the pupils themselves. What use do they make of the tests? What do they know of grade standards and the desirability of attaining to them? What would they do about it if they did know? Of course, we attempt to stimulate interest in the immediate test, and I suspect that many a teacher warns her class occasionally that another test may be given sometime and that she wants the class prepared. But however much she may exhort the class group to make a good class score, and however much we may claim that group tests are designed to "measure the efficiency of the entire school, not the individual ability of the few"; yet it is the individual who must take the tests. In the intermediate grades we have the beginnings of group consciousness, but the individual is the dominant factor. Hence, from a theoretical standpoint we should be warranted in considering individual pupils even more than we are warranted in considering individual teachers. From a practical standpoint, we have the

<sup>1</sup> An address delivered before the National Association of Directors of Education..I Research at Cleveland, Ohio, February 26, 1920.

evidence of the interest on the part of pupils when handwriting scales are displayed in the school room.

It is to call attention to this individual phase of the work and to report upon one of its possibilities that this paper is written. And it is because of the nature of the administrative details of the plan used to secure evidence, that we have chosen our topic—"The Campaign Method in Elementary Education."

A campaign is characterized: first, by a recognized need or desire on the part of those who organize it; second, by definite time limits, particularly for the close; third, by a definitely organized effort to stimulate and sustain interest. A fourth characteristic rests upon the fact that the success or failure of a campaign is determined by individuals other than those who organize it, whether it be by voters in the political campaign, converts in the religious revival, or subscribers to the fund. Furthermore the campaign has a peculiar value in awakening the individual to the duties and privileges of cooperation whether civic, social, moral, or intellectual.

This report will be concerned with three campaigns carried on in alternate years for the purpose of improving the work in the four fundamental processes in whole numbers, although we have some evidence to warrant the belief that the plan is just as feasible in the formal or mechanical phases of other elementary school work.

### THE FIRST CAMPAIGN

When we took charge of educational research in the Hibbing, Minnesota schools in the fall of 1915, one of our first acts was, of course, to give the Curtis Standard Research Tests in Arithmetic, Series B. We found that scores were considerably below standard. Accordingly the teachers were called together and asked to "emphasize" the work in the four fundamental processes with whole numbers. Then we turned our personal attention to other subjects.

In January of that school year, it was decided to introduce the departmental plan at one of our buildings. Ten intermediate-grade classes each having sixty-minute periods for recitation and supervised study were in the departmental group. With the introduction of this plan, another form of the Series B Tests was given. Nine school weeks with "emphasized" work in arith-

metic had elapsed since the first test. The improvement, however, in the use of whole numbers was slight, except that some increase in accuracy had been made in several cases. It was decided that "something must be done." In conference with the two teachers, each of whom had five arithmetic classes daily, it was decided to start work first with the pupils who had made the lowest scores.

On large sheets were placed the names of all the pupils and following each name were the scores made by that pupil in the November and January tests, with blank spaces for another test which was to follow. The date of this third test had not been set. Hence, one of the four chief characteristics of a campaign was lacking. The blank spaces after each name, however, tended to make a personal appeal for preparedness. These name sheets, together with charts showing class medians, were placed on the walls in the arithmetic rooms.

Next, the teachers listed, for their own information, the names of the pupils who had made the lowest scores. These pupils were told that they must do outside work. Thus, in the beginning we overlooked another characteristic of the true campaign. Instead of securing action by stimulating interest we were going to force action.

Then the drive started. The pupils on the low score list were furnished mimeographed sheets of examples to work at home. They also put in extra time before and after school. Pupils who were not required to do this extra work, when they saw other pupils doing so much, became concerned about their own standing. The result was that they, too, asked for drill sheets to take home. Then they commenced coming a little earlier in the morning, and soon they were working as industriously as the others. From this time on the work was largely voluntary on the part of the slower pupils as well. They timed themselves and each other, and estimated, as closely as possible, the improvement due to practice.

The pupils were shown how to make individual charts and these appealed to them even more than did the numbers representing their scores. The standard was represented by a red line and the pupil's performance by a green one. "Raise the green above the red" became the slogan.

The pupils had become so intensely interested in this phase of the work, and the amount of class time given to it was so limited

(five to eight minutes daily), that we saw no reason for stopping it. But at the end of eleven weeks the test was repeated.

In this discussion we shall not give detailed figures. Briefly, however, it may be stated that the improvement in rate of working represented a gain of at least a year and a half and in several cases two years or more, if we consider a gain of two examples as a normal year's progress. But a still greater gain was made in accuracy. In January, at the beginning of the campaign, out of four chances (one in each fundamental operation) for each of ten classes, or out of forty chances in all, only two class medians for accuracy reached or exceeded 90 percent, while fifteen were below 70 percent. But in April at the end of the campaign, sixteen or 40 percent of the cases were above 90 percent in accuracy and none were below 70 percent. The amount of improvement in the fifth and sixth grades for both rate and accuracy is graphically shown in Figures 1 and 2.

The campaign results fell short of the original plans in one particular. We expected to boost the makers of low scores up to the class median, or up to the standard for the grade if the class median was too low, and let the rest of the pupils alone. In that way we would secure closely graded, homogeneous groups in respect to the four fundamental processes in whole numbers. But class variation increased rather than decreased. That is, there was a greater difference in the number of examples worked by the highest and the lowest pupils at the end of the intensive period than there had been at the beginning. The point is that while the low score makers were advanced the original high score makers refused to "stay put." Truly, it has been said: "The brightest pupils are the most retarded."

### THE SECOND CAMPAIGN

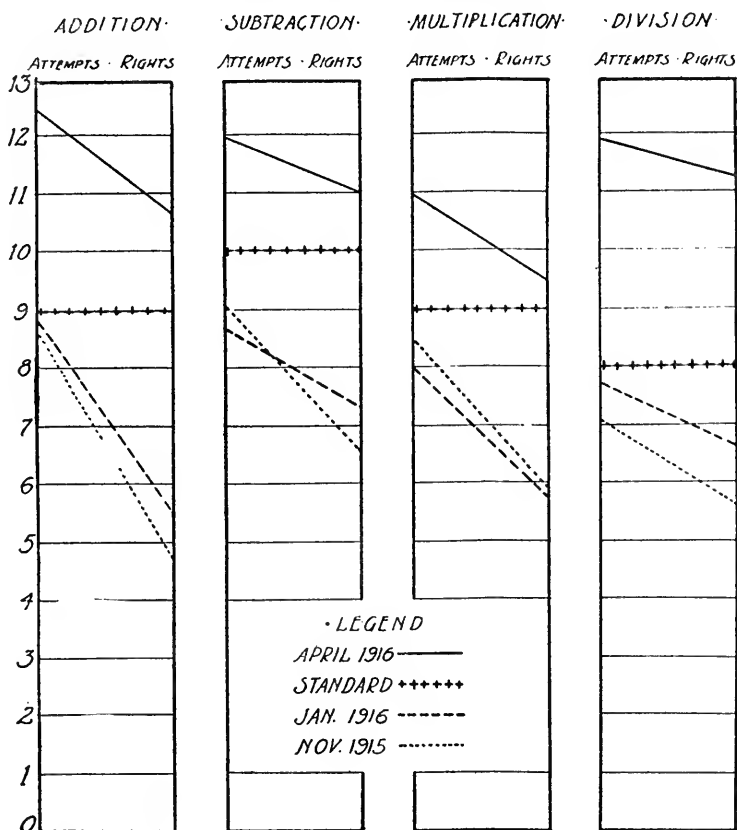
The next school year the tests were not used. But in the fall of 1917 we organized our second campaign. This time all four of the characteristics of a true campaign were observed. First, in order that the regular work might proceed under the most favorable conditions, we felt the desirability of bringing the work of the intermediate grades to a relatively high degree of excellence as early in the year as possible. Second, definite time limits were set. The campaign was to start just one month after school



# FIGURE 1. DEVELOPMENT OF FOUR SIXTH GRADE CLASSES

• NINE SCHOOL WEEKS BETWEEN NOV. AND JAN. TESTS •

• ELEVEN SCHOOL WEEKS BETWEEN JAN. AND APR. TESTS •



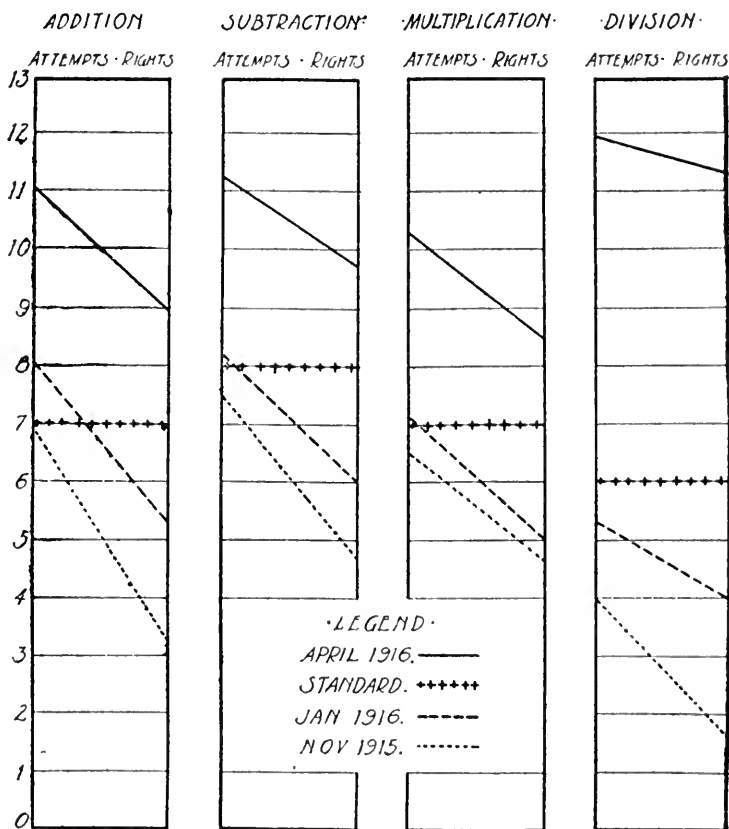
opened and was to close in exactly six weeks, finishing, therefore, just before Thanksgiving. Third, we made an organized effort to stimulate and sustain interest throughout the period; and fourth, of course, success or failure would depend upon pupil performance, i.e., would depend upon individuals other than the organizers.

In planning the second campaign so many factors were found to need study that we arbitrarily selected some and discarded others. For example, we knew that wide variation existed in each class and we knew that the plan followed in the first study

*FIGURE 2. DEVELOPMENT OF FIVE FIFTH GRADE CLASSES.*

*• NINE SCHOOL WEEKS BETWEEN NOV. AND JAN. TESTS.*

*• ELEVEN SCHOOL WEEKS BETWEEN JAN. AND APR. TESTS.*



would increase variability. But rather than discard the plan altogether it was decided to overlook this defect, since overtraining would not handicap a pupil in his work and since the period of such overtraining was to be short. Indeed, the only alternative would have been to discard the plan entirely, since the success of any campaign depends upon "boosters" among the people campaigned. Witness the preponderance of Democrats at a democratic rally or of Christian people at a religious revival. We determined, however, to obtain some check upon this phase of

the problem by observing the amount of voluntary work done by each pupil.

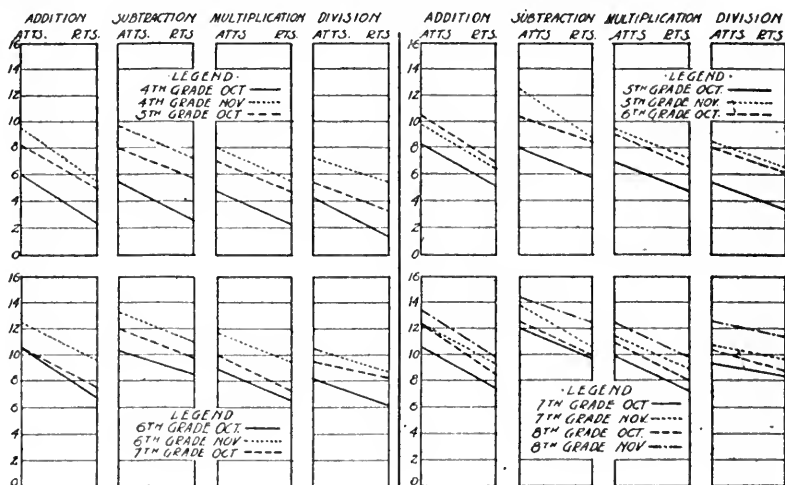
This time the work extended from the fourth to the eighth grades inclusive and in all schools where these grades were found. This included some fifteen schools, several of them one- or two-teacher schools. The number of pupils in each grade ranged in round numbers from 250 in the fourth grade to 150 in the eighth.

The amount of class time given to drill work was limited to ten minutes daily except in the case of the fourth grade in long division. The same general plans were followed as before. Lists of pupils' scores and class charts were displayed. Pupils were furnished all the examples they wanted for outside work, except that each teacher was asked to use her judgment in limiting the number given to individuals whom she considered physically unfit for outside work. But this time pupils were allowed to record the number of examples which they turned in for correction. For the most part these examples were never corrected. This matter will be touched upon again in connection with the third campaign.

The results of the second campaign were clear cut and decisive. The first test (the one given at the beginning of the second campaign) revealed the fact that the pupils were well graded in respect to ability in fundamental operations with integers, since there was, in general, a difference of one to two examples between each two successive grades and since in only one case did one grade median equal that of the next higher grade in any of the four operations. Furthermore, each grade median in rate with the exception of those of the fourth grade in subtraction and multiplication, was within one example of the Curtis standard for the grade. The second test given at the end of the six-week period, showed that, with but one exception, each grade median was above that which the next higher grade had earned at the beginning of the period. The one exception was the fifth grade in addition. At the beginning of the campaign the median of all median accuracies for all five grades in the four operations was 70 percent; at the end it was 78 percent with only two cases below 70 percent, these being in the sixties. At the end of the period, each grade, judged by the performance of its median pupil, was better prepared to deal with integers than the grade above had

been at the beginning of the campaign. These facts are shown in Figure 3. In terms of their own performance, all grades combined in all operations combined, improved the rate of work one-fourth and worked one-third more examples correctly.

FIGURE 3—RESULTS OF SECOND CAMPAIGN—SHOWING HOW EACH GRADE SURPASSES THE INITIAL RECORD OF THE NEXT HIGHER GRADE.



As stated before, the pupils kept records of the number of examples worked outside of class. The pupils of each grade were grouped on this basis. For each process, Group I was made up of pupils who reported that they worked less than one hundred examples; Group II reported 100 to 199 examples; Group III, 200 to 299 examples; and Group IV, 300 or more examples. The group medians in each grade and process were found for the tests given at the beginning and at the end of the six weeks' campaign. There were four groups for each grade, and each group had four medians, one in each process, except the fourth grade in division. Thus there were nineteen medians for Group I—three for the fourth grade, and four each for the succeeding grades. Similarly there were nineteen medians for Group II, nineteen for Group III, and nineteen for Group IV. Taking the median of these medians for each group, figures are obtained that represent respectively the performances of pupils who worked less than 100 examples, 100 to 199 examples, 200 to 299 examples, and 300 or more examples.

These figures reveal a high positive correlation between the number of examples worked and progress. In rate of working, the first group of pupils (who worked less than one hundred examples) gained less than two examples; the second group gained a little more than two, the third three, and the fourth four and one-half, or two years' growth in the six weeks. In the number of examples worked correctly, the gains were 1.2 for Group I; 2.7 for Group II; 3.5 for Group III; and 4.5 for Group IV.

Compared with Group I, the most industrious group not only made more than twice the gain in rate, and almost four times the gain in number worked correctly, but these gains were also made on the basis of a higher initial score. In the beginning there was a difference of approximately two examples in rate and one example in number correct between Groups I and IV.

### THE THIRD CAMPAIGN

We intended to use this information in the third campaign to be conducted in the fall of 1919. We were going to give each pupil, immediately following the initial test, a personal folder containing the number of examples in each process which he should work to bring his score up to the grade standard. This could be so handled that it would prove an additional incentive to work.

But as the time for the third campaign approached, a large part of the writer's time was taken up somewhat unexpectedly with administrative details in connection with our outlying schools. It was found impossible to give even the usual amount of attention to the campaign just at that time. Hence, it was decided to proceed with a very simple form of organization. The teachers gave the tests. Clerks scored the papers and made out individual score lists which were displayed in the arithmetic rooms. Announcement was made to the teachers that the campaign would close in six weeks, and they were asked to encourage the pupils to practice for the purpose of raising their scores. They were also asked to limit class-time drill to ten minutes daily. They were furnished with self-keyed drill cards for the outside work; and by a judicious distribution of these, overtraining was partially eliminated. Clerical help was provided to correct part of the papers. The amount of work turned in had made correction of papers impossible in the second campaign, but this time with

the help of self-keyed examples and some clerks, it was done. After correction, the papers were returned to the pupils who recorded the number worked correctly.

The initial and final tests were given to grades IV to VIII but the campaign was confined to the fourth, fifth, and sixth grades. The seventh and eighth grades served as controls.

The value of the plan, even when thus hastily and imperfectly organized, was apparent when the second test papers were scored. In the fourth, fifth, and sixth grades the median of all the gains made by all grades in all processes was 1.7 examples both in number worked and in number worked correctly. This indicates a gain in percent of accuracy. In the seventh and eighth grades, on the other hand, the gain was one-half of one example both in number worked and in number worked correctly. Furthermore, at the beginning of the campaign in the fourth, fifth, and sixth grades, no grade median in any process was equal to the Courtis standard for the grade except the fifth-grade medians in subtraction and division which exceeded it by one-tenth and two-tenths of one example respectively. But at the end of the campaign each grade median equaled or exceeded the standard in each process except the fourth grade in multiplication which missed it by one-tenth of one example. We are unable to report evidence of any value in having the pupils count only the examples they had correct, rather than having them count all examples worked. Using the same method of computing gain as that used for the second campaign, the gain in accuracy was only one-half as great as in the second campaign. This feature of the work should not be discarded, however, without further study because in the second campaign all pupils had been campaigned indiscriminately, while in the third campaign the subject was not emphasized as much in the better classes as in the poorer ones.

#### PERMANENCY OF ACQUISITION

The second campaign was conducted between October 3, 1917 and November 15, 1917. In June of that year a third form of the Courtis test was given. The object was to find out how much of the gain made during the second campaign had proved to be permanent. Only the scores of pupils who took all the tests were considered. Approximately the same results were obtained as at the end of the campaign in November. Slight additional

gains were made in the lower grades, while small losses were sustained in the upper grades. It will be recalled that in the six weeks of the second campaign pupils had in general improved one-fourth in rate of work and one-third in accuracy. The June test showed that the effect had lasted seven months.

The third campaign, which was conducted in the fall of 1919, afforded an opportunity to estimate the permanency of these gains over a still longer period. Two years had elapsed. The fourth, fifth, and sixth grades had now become the sixth, seventh, and eighth respectively. The first test in the third campaign showed in these grades the effects of the training two years before. In but three cases were these grades below the present grade standards as much as one example, even within a month after the beginning of the school year. In another month, without any attention to the subject in the seventh and eighth grades, except the giving of the tests, no grade median in any process was found to be below the present standard as much as one example.

#### SUMMARY AND CONCLUSIONS

To summarize, the first campaign with ten classes showed us the possibilities of the plan, but eleven weeks' work resulted in overtraining for most of the pupils. The second campaign, carefully organized and administered, caused each grade to attain a performance in excess of that of the next higher grade at the beginning of the campaign. This campaign also proved the positive correlation between amount of work and progress. The third campaign, hastily organized, and administered wholly by teachers, resulted in a gain of almost two examples. And from the first test of this campaign was obtained some evidence of the permanent value of the previous one.

In discussing the characteristics of a campaign, we mentioned its value as a means of awakening individuals to the duties and privileges of cooperation. It is impossible to gauge this value exactly any more than we can calculate the degree of national awakening due to the Liberty Loan campaigns or the broadening of human sympathies due to the great war-relief drives. Yet it is certain that these school campaigns were valuable in fostering the spirit of cooperation. Pupils sought aid of each other, and in turn, offered help; parents were asked by their children to time and examine the home work; and the schools themselves came in

for their share of parental attention. If you doubt this, start a campaign in your school in arithmetic or geography or spelling or oral English. But allow me to suggest the inadvisability of starting more than one at a time, or of following one too closely by another.

Any one who has ever seen pupils of the intermediate and grammar grades gathered around a chart dealing with any aspect of their school work ranging from school attendance to classroom performance will not deny the possibilities of a further use of such charts. Children, like the rest of us, want to know just what their task is, and particularly what the limits are. Moreover, they work best when they know that their own performance rather than some teacher's judgment will decide the success or failure of their efforts. We have tended too much, in school work, to emphasize the lower limit—the passing mark—and to refuse to acknowledge the possibility of any pupils reaching the upper limit—100 percent. Children refuse to accept this view of their own limitations, but what can they do about it? Even when the teacher knows exactly what she wants, the pupils seldom know. Their task is to keep busy and avoid making trouble. Their problem is analogous to what ours would be if we were sent to a machine shop or a prescription counter or a lawyer's office and told to keep busy, to learn as much as possible about mechanics or drugs or the law, and, above all, not to disturb anyone else. But how different the pupil's problem becomes when he knows exactly what he can do now, and what he is challenged to be able to do at a given time; and when he knows that the success or failure of his efforts will be determined by his own performance at that time.

Allow me to say in conclusion that although we do not yet know the limitations of the plan, we do know that we can cause a grade to make a year's normal progress in the use of whole numbers in six weeks. And although we do not hail it as a panacea for all the ills of elementary education, we are firmly convinced of the value of the campaign plan in all aspects of school work which depend upon the memorizing process or the acquisition of skill, or in any field where definite standards can be established and reliable measures of attainment are available.



## EDUCATIONAL MEASUREMENTS IN A SMALL SCHOOL SYSTEM

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Really to know how the results of teaching fundamental subjects in their school system compared with the work of other organizations over the country became the desire of the teachers of Anoka city schools. They had been told that the schools were the best in the land by patrons and by school board members. The state inspectors who spent from half a day to a day each year with them said that the instruction was good. But these snap judgments hardly sufficed to give any satisfaction in the face of present day educational science.

The desire to know caused these teachers to measure their work by standards which were being used in other school systems. They made a study of many tests and school surveys in order to secure means for testing and data for comparison. They used as texts *Educational Tests and Measurements* by Monroe, DeVoss, and Kelly, and *The Scientific Measurement of Classroom Products* by Chapman and Rush. The instructions and directions for all tests were studied very carefully. It was finally decided that the school work should be measured by the following scales and tests:

1. Ayres Handwriting Scale, "Gettysburg Edition"
2. Ayres Spelling Scale
3. Nassau County Supplement to the Hillegas Composition Scale
4. Thorndike Scale Alpha 2 for Measuring the Understanding of Sentences
5. Kansas Silent Reading Tests
6. Courtis Standard Research Tests in Arithmetic
7. Stone Reasoning Tests
8. Trabue Completion-Test Language Scales.

In order to make the giving and grading of the tests as uniform as possible and in order that the burden should not be too great upon any group of individuals, a number of teachers' meetings were conducted. These served to familiarize all the teachers with the giving and scoring of tests and papers. In every case the

teachers' results were checked by one to four competent persons. The board of education thought the work of so much worth that it secured extra clerical help for checking and tabulating.

The work began in March, 1919, and ended early in May. It consumed a great deal of time and energy but the satisfaction of knowing where we were weak and where we were strong more than repaid us for all our pains.

Because spelling tests were the easiest to correct, we began with that branch of the work. We found that the Springfield, Butte, and Elyria school surveys used those word columns which demanded a spelling ability of 73. Accordingly, words were taken from those lists. Table I shows the median scores made by grades II to VIII. It also gives the scores made by other school systems. We find by comparison that Anoka stands a little better in almost every grade (except the third) than three other systems and worse than two. That is, the teaching of spelling may be characterized as average except in the third-grade classes. In these classes, the results were poor.

The fact that the third-grade classes fell so far below the rest of the system demanded explanation and caused investigation. From the age-grade table we found that the average age for the fourth-grade classes at the beginning of the year was nine years and five months. The average of the third-grade classes was nine years and eight months. This indicated retardation. Upon investigation with the opposites and the Binet-Simon tests, eleven subnormal individuals were found in this grade. This may have been the cause of the poor spelling. However, other causes were found to be the lack of suitable lists of words and poor teaching methods. There was too little individual attention, too much repetition of easy words, too little repetition of difficult words, too much oral spelling, and not enough sentence dictation.

The tests brought to us better methods of teaching spelling. The sixteenth and eighteenth yearbooks of the National Society for the Study of Education, all other available material upon the teaching of spelling, and word lists were brought into use. Numerous tests and contests were undertaken. During September, 1919, tests were given again. Another sampling will be taken in March, 1920, in order to measure improvement.

TABLE I. AYRES SPELLING SCALE—MEDIAN SCORE

GRADE	ANOKA			SPRING-FIELD	BUTTE	COLUMBIA	ELYRIA	PORTLAND	AYRES
	Franklin School	Washington School	Mean						
II...	77	89	83	70	86	69	48	90	73
III...	59	37	48	65	82	66	64	79	73
IV...	65	81	73	70	79	70	67	88	73
V...	74	82	78	72	85	68	69	87	73
VI...	80	75	78	68	75	74	75	87	73
VII...	77	81	79	73	76	69	72	82	73
VIII...	74	.....	74	75	89	67	67	86	73

Because we could secure results for comparison from the various sources and because of the ease of scoring, we adopted the Kansas Silent Reading Tests to measure our results in silent reading. Table II gives the median results for the two Anoka grade buildings. With the exceptions of one third grade, one seventh and one eighth grade, the scores stand well above the average. This third-grade score is low because the whole group had been divided into divisions upon an intelligence basis. The section which made the low marks was the slowest moving division. The low record made by the Washington seventh grade may be accounted for by the fact that the regular teacher was called home on account of sickness. She and her substitute were going over the week's plans while the youngsters were taking the tests. We could in no way account for the work done on this test by one eighth grade. In order to find further proof for poor reading ability in the two grades mentioned, we administered the Thorndike Scale Alpha 2 for Measuring the Understanding of Sentences. The score made by the children was that standard of "8" given by Thorndike for the second year in high school. However, as we know nothing about the correlation of these tests, one with another we cannot say anything concerning the reading ability of these children other than that they stood low according to the Kansas standard and high according to the Thorndike standard. We did derive a great deal of satisfaction from the fact that the youngsters could read well according to Thorndike.

TABLE II. KANSAS SILENT READING TEST—MEDIAN SCORES

GRADE	ANOKA			KANSAS	IOWA	FAR WEST	SOUTH-ERN	AUTHOR
	Franklin School	Washington School	Mean					
II.....	5.2	4.75	5.0	.....	.....	.....	.....	.....
III.....	{ 2.3 9.5	10.6	7.8	4.9	6.2	6.1	4.7	5.3
IV.....	14.6	13.0	13.8	9.0	9.5	10.6	8.4	9.5
V.....	14.6	16.3	15.4	13.4	14.6	14.4	12.3	13.2
VI.....	13.0	14.9	14.0	13.7	14.8	15.0	11.8	13.9
VII.....	22.3	13.5	17.9	16.1	17.7	18.0	15.4	16.2
VIII.....	{ 19.7 15.8	.....	17.7	20.1	20.6	20.6	19.2	19.2

Even though our scores were high throughout, our teachers were not satisfied with their teaching of reading. They are endeavoring to learn the most scientific methods of teaching this subject. Silent reading now gets more emphasis. This fact is evidenced by the use made of lists of supplementary readers, the requisitions for new material, the increased use of the various libraries, the call for much more new library material (both books and magazines), and the lists of outside reading posted and used in each grade room.

Table III gives the median results for the Stone Reasoning Tests. These tests were corrected and graded by three people. In giving the tests, the teachers were especially careful to follow directions. The results obtained were the most gratifying of all. The scores no doubt demonstrate the reading ability of the pupils as well as their reasoning power. The median accuracy scores are higher than the median reasoning scores of all the other cities except those of Salt Lake City. The scores may indicate that in the study of arithmetic, too much emphasis has been placed upon this type of work. The results for the Courtis Standard Research Tests in Arithmetic, Series B, also suggest that perhaps too much time and emphasis are devoted to reasoning problems and not enough to habit formation in the four fundamentals. While the speed and accuracy scores are not the lowest within the lists of comparisons, they fall far short of the author's standards and the better work of some of the schools listed. Table IV shows the

TABLE III. STONE REASONING TESTS—MEDIAN SCORES

GRADE	REASONING SCORES							ACCURACY SCORES		
	ANOKA			BUTTE	SALT LAKE CITY	ELGIN	JANES- VILLE	ANOKA		
	Frank- lin	Wash- ington	Mean					Frank- lin	Wash- ington	Mean
V.....	4.2	4.0	4.1	2.2	3.7	2.9	2.4	3.2	4.0	3.6
VI.....	6.4	5.0	5.7	3.9	6.4	5.0	3.4	5.5	4.0	4.7
VII.....	6.8	10.8	8.8	5.8	8.6	6.0	5.8	6.8	9.9	7.9
VIII.....	9.7	.....	9.7	7.7	10.5	8.0	6.3	9.4	.....	9.4

median number of examples correct at Anoka and a comparison of these figures with those obtained elsewhere and with Mr. Curtis' standards. The comparisons for the number of examples attempted and for the percent of accuracy indicate about the same relative position for Anoka. The results informed us that much time, energy, information, and teaching ability will be necessary to bring our schools up to standards set by other schools and by the needs of ordinary life. As soon as the scores were reported the teachers began to call for all types of information upon teaching and drilling fundamental facts in number work. Four sets of Studebaker Economy Practice Exercises in Arithmetic<sup>1</sup> were purchased and are now used. The sixteenth and eighteenth year-books of the National Society for the Study of Education were again brought into service. Better teaching of the fundamentals will result.

The product of a handwriting test was judged both for speed and quality by means of the Gettysburg Edition of the Ayres Handwriting Scale. The work was done by two teachers, the writing supervisor, and the teacher of commercial subjects. The average of their scores was taken. As the median marks indicate, the speed of the pupils is high and the quality is low. The only remedy we can find for this condition is not less attention to speed but more attention to letter and word formation. By a study of the quality (Table V) we notice that there is no marked improvement in ability to write more legibly until we reach the seventh grade. This grade as well as the eighth suddenly approach the standard in quality. The cause for such poor penmanship in the

<sup>1</sup> These are published by Scott, Foresman and Company.

lower grades and such sudden improvement in the upper grades may be due to the writing method used. We feel that we wish to develop rapid writers rather than slower drawers. We have not yet found a method whereby we can keep our speed and at the same time teach better quality.

TABLE IV. COURTIS STANDARD RESEARCH TESTS IN ARITHMETIC, SERIES B—RIGHTS

GRADE	ANOKEA			DE-TROIT	BOS-TON	IND- IANA	SALT LAKE CITY	BUTTE	COL- UMBIA	KAN- SAS	AUTHOR
	Frank- lin	Wash- ington	Mean								
Addition											
IV..	2	2	2	.....	.....	.....	.....	.....	.....	.....	6
V..	4.2	3	3.6	5.7	6.6	3.6	4.1	2.9	2.4	3	8
VI..	4.8	4.9	4.8	7	8.3	4.4	6.4	3.4	2.9	3.9	10
VII..	5	4	4.5	7.5	9.0	4.9	6.9	3.8	3.9	4.8	11
VIII..	6	.....	6	9.4	10.4	5.8	8.5	5.3	4.0	5.4	12
Subtraction											
IV..	3.5	4	3.7	.....	.....	.....	.....	.....	.....	.....	7
V..	7	6	6.5	7.9	7.7	5	5.2	5.5	4	4	9
VI..	6.4	6	6.2	8.6	9.5	6.5	7.8	5.8	4.8	5.9	11
VII..	8	7	7.5	9.9	10.3	7.9	8.8	7.1	5.6	7.2	12
VIII..	12	.....	12	12.5	11.8	8.9	9.8	9.8	5.4	7.7	13
Multiplication											
IV..	4	4	4	.....	.....	.....	.....	.....	.....	.....	6
V..	6.3	4	5.2	5.8	5.6	3.9	4.3	4.1	3.4	3.1	8
VI..	5.4	5	5.2	7.2	7.2	5.1	5.3	5.0	4.4	4.7	9
VII..	5.8	7	6.4	7.8	8.2	5.9	7.1	6.5	5.5	5.9	10
VIII..	8.4	.....	8.4	9.8	9.3	7.3	8.3	8.1	4.6	8.3	11
Division											
IV..	4	2	3	.....	.....	.....	.....	.....	.....	.....	.....
V..	5	3	4	4.6	4.9	2.6	3.0	3.6	2.5	2	6
VI..	4.2	3	3.6	7.3	7.4	4.8	5.5	4.3	3.9	3.5	8
VII..	4.6	6	5.3	9	8.8	6.7	7.7	7.2	5.5	5.3	10
VIII..	8.8	.....	8.8	11.7	11.0	9.1	9.5	10.2	5.5	8.3	11

Language and composition ability were tested and scored by the Trabue Language Scales, Series B and C, and by the Nassau County Supplement to the Hillegas Scale. By the median scores in Tables VII and VIII it may be seen that the pupils stand high in language and composition writing abilities. The

compositions were scored by four judges. Two of these were teachers, the third was the superintendent, while the fourth was engaged from outside the system. The judgments were independent. The average of the four opinions was taken as the final score. While some differences in scores were found, there was a striking similarity in the four sets of marks.

TABLE V. AYRES HANDWRITING SCALE "GETTYSBURG EDITION"—  
MEDIAN QUALITY SCORES

GRADE	ANOKA			CLEVE- LAND	KANSAS	ILLINOIS	IOWA	AYRES	GARY
	Frank- lin	Wash- ington	Mean						
II...	30	33	31.5	.....	44	39.7	35.7	38	.....
III...	{ 30								
	{ 33	30	31	.....	47	42	39.8	42	30
IV...	30	33	31.5	.....	50	45.8	44.5	46	31
V...	37	33	35	45	55	50.5	49.1	50	34
VI...	37	47	42	48	59	54.5	52.3	54	36
VII...	63	50	56.5	50	64	58.9	57	58	39
VIII...	{ 50	.....	58.5	55	70	62.8	61	62	42
	{ 67								
IX...	.....	.....	85	.....	.....	.....	.....	.....	43

TABLE VI. AYRES HANDWRITING SCALE—"GETTYSBURG EDITION"  
MEDIAN SPEED SCORES

GRADE	ANOKA			CLEVE- LAND	KANSAS	ILLINOIS	IOWA	AYRES	GARY
	Frank- lin	Wash- ington	Mean						
II...	30	35	32.5	.....	32	30.6	39.2	32	.....
III...	{ 32								
	{ 42	42	38.5	.....	35	43.8	49.2	44	18
IV...	55	88	71.5	.....	51	51.2	61.9	56	45
V...	81	84	82.5	60	61	59.1	65.5	64	58
VI...	72	84	78	70	67	62.8	72.6	70	70
VII...	82	86	84	78	71	67.9	75	76	80
VIII...	{ 84	.....	88	80	73	73	76.5	80	90
	{ 92								
IX...	.....	.....	86	.....	.....	.....	.....	.....	100

TABLE VII. TRABUE LANGUAGE SCALES, SERIES B AND C

GRADE	AUTHOR'S STANDARDS	ANOKA		
		25-percentile	Median	75-percentile
II.....	6	10	12	16
III.....	12	11	13	16
IV.....	16	14	18	21
V.....	18	18	22	25
VI.....	22	21	25	28
VII.....	24.6	23	26	28
VIII.....	26.6	23	26	29
IX.....	28.4	27	28	31

TABLE VIII. NASSAU COUNTY SUPPLEMENT TO THE HILLEGAS SCALE—MEDIAN SCORES

GRADE	ANOKA			SALT LAKE CITY	BUTTE	AUTHOR
	Washing-ton	Franklin	Mean			
III.....	2.5	3.2	.....	.....	.....	.....
IV.....	3.5	3.5	3.5	2.9	2.34	3.5
V.....	3.1	3.8	3.45	3.1	2.87	4.0
VI.....	4.1	4.8	4.45	3.8	3.40	4.5
VII.....	4.9	5.5	5.2	4.4	3.75	5.0
VIII.....	.....	6.1	6.1	5.4	4.11	5.5

The measurement work above described has been very beneficial to the teachers, supervisors, principals, and superintendent. This is proved by the fact that some of the teachers have asked that during the present year two measurements be taken. The first samples were taken in October. The second will be taken in April. We shall then be able to see how much improvement has been made in the various subjects and grades.

This study of the tests has been a great help to the school system. It has acquainted the teachers with the measurement movement in education. It has helped them to discover individual weaknesses in various pupils. It has made the faculty more cognizant of individual differences. They are beginning to learn best methods for teaching fundamentals; methods based not so much upon *a priori* reasoning as upon facts, results, and investigations.



There has been much professional growth on the part of the faculty. As a manifestation of their interest sixteen of the force are taking a University of Minnesota extension course in mental diagnosis. This knowledge should bring further improvements in their teaching.

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# SUBSTITUTING SMALL NUMBERS FOR LARGE ONES IN THE COMPUTATION OF COEFFICIENTS OF CORRELATION

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Great economies of time and labor in the computation of coefficients of correlation may be effected through reducing the magnitude of the numbers used, without changing the trends of the two series for which the coefficient is to be found. Taking two very short series for illustrative purposes, we may suppose that we desire to find the correlation between the following:

S	R
—	—
22	108
23	110
25	110
26	113
27	114

In computing the correlation we are ascertaining the amount of agreement between the trends of the two series. These trends are determined, not by the size of the numbers in each series, but by the amounts by which the larger numbers in each series are in excess over the smaller ones. Because of this, the trend of the first, or subject series will be unchanged if we subtract 21 from each item in it and the same will hold true for the second, or relative, series if we subtract 107 from each item. The two series now become the following:

S	R
—	—
1	1
2	3
4	3
5	6
6	7

The correlation computed from the smaller numbers is just the same as that from the larger ones and the work is much easier. The rule to follow in most cases where it is desired to find the coefficient of correlation between two listed series of paired values

is to begin by subtracting from each number of each series an amount that is smaller by one than the smallest number in the series.

In most tables of distribution, the values are stated by classes as in the following instance:

Annual Salary in Dollars	Years of Service				Total
	1 to 1.9	2 to 2.9	3 to 3.9	4 to 4.9	
600 to 699.....	4	1	1	.....	6
700 to 799.....	1	2	5	2	10
800 to 899.....	1	7	10	4	22
900 to 999.....	1	4	7	10	22
Total.....	7	14	23	16	60

In this case the scale of salaries runs by steps of \$100 each and that of years by steps of 1 year each. The correlation should be computed from a table in which these steps have been substituted for the original values. The table will be as follows:

S	R—Years				Total
Salaries	1	2	3	4	
1	4	1	1	.....	6
2	1	2	5	2	10
3	1	7	10	4	22
4	1	4	7	10	22
Total	7	14	23	16	60

It might be thought that the scale for salaries ought to be entered as 6, 7, 8, and 9 instead of as 1, 2, 3, and 4, but, as has already been shown in the previous example of the listed pairs, the results will be the same in either case so it is better to use the smaller numbers.

The computation of the coefficient of correlation from the data of this example tabulated in its first form and with the service and salary classes stated in full, gives as a result

$$r = \frac{2,400}{\sqrt{560,000 \times 55.6}} = \frac{2,400}{\sqrt{31,136,000}} = \frac{2,400}{5,580} = 0.43$$

When the same operations are carried through with the same data tabulated in the simplified form with the classes stated as 1, 2, 3, and 4 the result is

$$r = \frac{24}{\sqrt{56 \times 55.6}} = \frac{24}{\sqrt{3,113.6}} = \frac{24}{55.8} = 0.43$$

While the coefficient of correlation is the same in both cases, it must be noted that care must be taken in stating the meaning of the coefficients of regression. This coefficient for the subject series, when derived from the original tabulations, is  $\frac{2,400}{560,000} = 0.0043$

which indicates that on the average in this group the individuals tend to advance  $\frac{43}{10,000}$  of a year in service for each additional

dollar of salary, or 0.43 years in service for each \$100 of additional salary.

If the corresponding coefficient of regression is derived from the data of the simplified tabulation it is  $\frac{24}{56}$  or 0.43. The mean-

ing of this is clear if we remember that the 56 in the fraction is derived from the subject series which gives data for salaries, which are in this case stated in terms of steps of \$100 each. The fraction then indicates that for each \$100 of increase in salary these individuals tend to advance 0.43 of a year in service. The other regression is  $\frac{24}{55.6} = 0.43$  and indicates that for each additional

year of service they tend to advance 0.43 of \$100 or \$43.

The foregoing paragraphs may be summarized in three simple statements. The first is that in computing the coefficient of correlation from listed series of paired values the first step is to subtract from each item of each series a number that is smaller by one than the smallest number in the series. The second rule is that in finding the coefficient of correlation from a table of distribution the first step is to substitute for the two series of class values, the numbers 1, 2, 3, 4, etc., being careful to omit any number for which the corresponding class is missing in the original series. The third rule is that in the interpretation of the coefficients of regression it must be remembered that the values are now stated in terms of the class values or steps of the original tabulation.

# Editorials

## DR. AYRES' FORMULA

A number of inquiries have been made as to the proof of the short method of computing correlation coefficients which Dr. Ayres described in our March issue. The method is entirely rigorous mathematically. Moreover it relates closely to methods already known and used.

Those who work with correlation tables are accustomed to assume averages for the subject and relative series. The deviations are worked out from these assumed averages, and the corrections—i.e., the differences between the assumed and the true averages—are applied. What Dr. Ayres has done is, in effect, to assume an average at zero for both the subject and relative series. The correction or difference between the assumed average and the true average then becomes the true average itself.

Notice how this works out. The formula for the computation of the Pearson correlation coefficient when it is computed from an assumed average may be written as:

$$r = \frac{\sum xy - nc_x c_y}{\sqrt{(\sum x^2 - nc_x^2)(\sum y^2 - nc_y^2)}} \dots \dots \dots (1)$$

In this formula  $c_x$  is the correction to the assumed average for the subject series and  $c_y$  is the similar correction for the relative series. In other words,  $c_x$  is the difference between the assumed and the true average for the subject series and  $c_y$  is the difference between the assumed and the true average for the relative series. Now when the assumed averages are taken to be zero,  $c_x$  becomes the average of the subject series and  $c_y$  becomes the average of the relative series. Moreover  $x$  and  $y$ , being deviations of the measures or items from zero, are the measures themselves.

Substitute, therefore, in the above formula for  $c_x$ ,  $A_x$  and for  $c_y$ ,  $A_y$  where  $A_x$  and  $A_y$  stand for the averages of the subject and relative series respectively. The formula then reads:

$$r = \frac{\sum xy - nA_x A_y}{\sqrt{(\sum x^2 - nA_x^2)(\sum y^2 - nA_y^2)}} \dots \dots \dots (2)$$

Consider now the fact that, by the definition of an average,  $A_y = \frac{\text{tot. of relative items.}}{n}$ . If this fraction is substituted in the

second term of the numerator in (2), the numerator becomes

$$\Sigma xy - (nA_x) \left( \frac{\text{tot. of relative items}}{n} \right) \dots \dots (3)$$

and the  $n$ 's cancel. Of course, this is very inelegant; but if, in an effort to be clear to the non-mathematical reader, we carry our inelegance still further, we may (remembering that  $x$  and  $y$  are now the items themselves) write (3) as:

$$\begin{array}{c} \text{"Sum of products of subject and relative items} \\ \text{minus} \\ \text{av. of subject items} \times \text{tot. of relative items"} \end{array}$$

This is the numerator of the formula as Dr. Ayres gives it (p. 219).<sup>1</sup>

Similar substitutions may be made for  $A_x$  and  $A_y$  in the denominator of (2). Making these substitutions and noting that an average times the number of items equals the total of the items, we obtain the denominator of the formula as given by Dr. Ayres.

Thus his formula is an application of the usual formula to the case where the assumed average or point of reference is taken as zero. A more mathematical proof might begin by expressing each measure as the sum of the average of its series and its deviation from the average. Thus each measure becomes a binomial whose first term is the average of the series and whose second term is the deviation of the measure from the average. In order to investigate the identity of Dr. Ayres' formula with the usual formula for computing the correlation coefficient, it would next be necessary: (1) to form the products of the successive pairs of measures as written in this binomial form; (2) to square the successive binomials constituting the subject series; and (3) to square the successive binomials constituting the relative series.

The first of these operations gives us a polynomial of four terms for each pair of measures. For the first pair it would be  $A_x A_y +$

<sup>1</sup> Of course, we could have substituted for  $A_x$ . In that case the numerator of Dr. Ayres' formula would become the "sum of the products of the subject and relative items minus av. of *relative* items  $\times$  tot. of *subject* items." In other words, the deduction may consist of the product of the average of either series and the total of the other.

$A_y d_1 + A_x D_1 + d_1 D_1$  where  $A_x$  and  $A_y$  have the same meanings as before and  $d_1$  and  $D_1$  are the deviations of the first subject measure and the first relative measure respectively. Summing the polynomials of this type, we obtain  $nA_x A_y + A_y \Sigma d + A_x \Sigma D + \Sigma d D$ . Observe, however, that since the sum of the deviations from an average must be zero, the second and third terms of the last expression disappear. Observe also that  $\Sigma d D$  is the same as the  $\Sigma xy$  of the usual formula. Evidently, therefore, if we deduct  $nA_x A_y$  from this expression, we have the  $\Sigma xy$  which we recognize in the numerator of the Pearson formula. Since  $nA_y$  equals the total of the relative items,  $nA_x A_y$  is "Av. of subject items  $\times$  tot. of relative items."

Similarly, the second and third of the operations mentioned above give a series of polynomials of three terms. Their summations yield expressions of the following type (using the notation for the subject series)  $nA_x^2 + 2A_x \Sigma d + \Sigma d^2$ . Here again, since the summation of deviations is zero, the middle term vanishes.  $\Sigma d^2$  is the usual  $\Sigma x^2$ . The reduction must, therefore, be  $nA_x^2$ , or  $A_x(nA_x)$ , or "av.  $\times$  total of sub. items." Hence the first quantity under the radical in the denominator of the Ayres' formula proves to be the same as the first quantity under the radical in the denominator of the usual Pearsonian formula. The second quantity proves out in exactly the same way.

The Ayres' formula will therefore yield the same results as the usual Pearson formula, and workers are justified in using it for any advantages which it may have.

B. R. B.

## Reviews and Abstracts

BROWN, H. A. *A study of ability in Latin in secondary schools.* Oshkosh, Wisconsin: State Normal School, 1919. 170 pp.

This monograph gives the results of an investigation carried on among the high schools of New Hampshire while President Brown was Director of the Research Bureau connected with the Department of Public Instruction of that state. The tests with the discussions and conclusions based upon them constitute an important addition to the material for measuring the results of high-school instruction. The monograph is for free distribution and may be obtained by addressing the author. A separate edition of the tests is published by the Parker Company, Madison, Wisconsin.

The outstanding feature of the report is the disclosures which it makes of the extremely meager knowledge of Latin which the children had obtained in these New Hampshire high schools. The author believes that the schools are equal to the average of secondary schools, and that the condition as found in them is essentially typical.

At the conclusion of a year's study of Latin, only one-half of the pupils were able to translate sentences as hard as: "*Est copia frumenti in agris nostris.*" After four years of instruction only one-half of the pupils were able to translate a sentence as hard as: "*Dixit aedificium in quo Hannibal esset multos exitus habere.*" The Latin sentence test, although the author supposed that it would prove too easy for the third- and fourth-year pupils, proved on the contrary to be too difficult. This was true despite the fact that the sentences represented the easier ones in beginners Latin books. In terms of medians, first-year pupils were scarcely able to translate two out of the twenty sentences, second-year pupils less than four, third-year pupils less than six, and fourth-year pupils a little over six. The product, therefore, of four years of instruction was the ability to translate six out of twenty sentences representing the easier exercises in beginners Latin books. Since the pupils were given practically all the time they needed, this may be understood to be their best effort.

The investigation might have stopped here. Corroborative evidence, however, was obtained by administering a "connected Latin test," a grammar test, and a vocabulary test. Good scores were obtained only in the vocabulary test; but this was because of its extremely simple character. The five most difficult words were *ipse*, *munio*, *quisquam*, *copia*, and *pax*.

Apparently, therefore, each of the tests tells the same depressing story. It is idle to indulge in arguments as to the "value of Latin" when the evidence is altogether to the effect that children do not learn Latin. The battle of the classicists and the scientists or realists or whoever they are who attack the study of the ancient tongues, suddenly becomes a battle of kites and crows. The issue seems to be of no consequence and the victory not worth fighting for. If Mr. Brown's results are typical, only a very few boys and girls are getting enough Latin to do them any good no matter what its disciplinary, cultural, or linguistic values may be.

B. R. B.



*Sixth conference on educational measurements.* (Bulletin of the Extension Division, Indiana University, v. 5, no. 1, September, 1919.) Bloomington, Indiana: Extension Division, Indiana University, 1919.

The bulletin, giving the papers submitted at the Sixth Conference on Educational Measurements held by the School of Education of Indiana University, measures up to the quality of its predecessors. Monroe, at that time director of the Bureau of Co-operative Research, states the keynote of the meeting to have been "a plea for diagnosis and more complete interpretation of educational measurements in order that the use of educational tests may result in the greatest possible improvement of instruction." Of the thirteen papers in the bulletin, three by Charters relate to the diagnosis of language and grammatical errors and to scientific curriculum construction, seven by Dr. and Mrs. Pressey and others relate to tests of intelligence, two by Ashbaugh relate to educational service in Iowa and to recent developments in spelling, and one by Monroe discusses next steps in educational measurements.

Charters points out the present composition scales are unanalyzed and hence not particularly useful for diagnostic purposes. He describes in his first two papers his diagnostic language and grammar tests for pronouns, their construction and uses, and the corrective measures to be employed after diagnosis.

The "Cross Out Tests" and the "Primer Scale" for grades I and II are described by Dr. and Mrs. Pressey and their advantages in economizing time and avoiding difficulties in scoring are pointed out. It is interesting to note that this abbreviated team of tests gives a correlation with teacher's rankings of  $+0.58$ .

Superintendent Montgomery gives the results of applying Pressey's Mental Survey Test No. 1 at Bedford, Indiana; and State High School Inspector Williams reports the plans for administering the same test to all senior students in the six hundred commissioned high schools of the state. Next to the tests in the army this is the most comprehensive attempt at intelligence measurement recorded and its results will be watched with interest.

Chester S. Carney, consultant with a firm of industrial engineers, at Boston, Massachusetts, reports experiments with mental tests as an aid in the selection and placement of clerical workers in a large factory. A variety of intelligence tests were first tried out on time clerks, but yielded unsatisfactory results. A job analysis of the time clerks' tasks was then resorted to and tests modified or constructed which would probably be diagnostic of ability in these tasks. Mr. Carney concludes that highly specialized tasks may require particular ability which is discoverable only by tests designed for that purpose; and that, while for such purposes general intelligence tests are of little value, they are increasingly useful with reference to the more responsible positions. While personality is not measurable by tests, but must be judged by an interview, "the employer who has once been so fortunate as to obtain and use a really scientific set of tests, will never again be satisfied to pick his men by the haphazard impressions of an interview alone."

Charters, in discussing scientific curriculum construction, attributes the dissatisfaction with the curriculums of the school as not fitting the needs of modern life to three factors: first, the assumption that the best method of equipping for life is to acquaint young people with the organized fields of knowledge according to the systematic arrangement of each; second, the failure to analyze the aims of education until objectives sufficiently detailed have been determined; and third, the failure of educa-

tional psychology to assist the trial and error method of testing by providing a body of facts according to which the material of the curriculum may be arranged in proper pedagogical sequence. For the first method of constructing a curriculum by the impartation of the essential content of each of the highly organized fields of human achievement, Charters argues for a second, "that of studying the daily lives of men to find the most important problems and the selection, from any source available, of such items as will solve these problems." The aims of education are stated in such vague and general terms as to be practically of no use in selecting subject matter. They must be stated in terms of definite working units of achievement. Educational psychology has as yet not given such definite information concerning the interests, abilities, and needs at different ages as to make possible concretely the arrangement of a curriculum in accordance with the psychological nature of children. Various studies, crude and partial, in scientific curriculum making have been made, based on errors or difficulties encountered, on cumulative opinion, on the analysis of projects and on analysis of major objectives.

Monroe, after a brief review of the progress in educational measurements, discusses the next steps under three heads: (1) a critical evaluation of existing educational tests; (2) a more refined and complete interpretation of results; and (3) the use of educational measurements as a basis for modifying instruction.

Ashbaugh in his first paper reviews the five-year history of measurements in Iowa, and in the second the recent work in spelling. This has centered on three problems: (1) the selection of spelling lists; (2) the method of teaching and learning; and (3) the development of scales and tests. The selection of words on the basis of frequency of use in adult correspondence is regarded as the best of the methods so far used. Experimental results are given to show that the method of teaching is not the important thing in spelling, but the method of learning. In measuring results tests and scales are of value for mass results, but individual words and individual pupils may be expected to vary widely from a standard.

V. A. C. HENMON

WHITE, WILLIAM A. *The mental hygiene of childhood*. (Mind and health series.) Boston: Little, Brown and Company, 1919. 193 pp.

This little book does not aim to present an exhaustive analysis of the mental life of the child. It is rather an attempt to put in popular form such principles of the Freudian psychology as may be of value in the training of children. Two conclusions seem to the author to be of especial importance in this connection, one concerning the child, the other concerning the family. "The conclusion concerning the child is that, contrary to generally held opinions, it is possessed of a developing sexuality the roots of which reach back into its infancy. The conclusion concerning the family is also contrary to the opinions regarding that institution commonly held, namely, that there reside within its organization and as a part of its nature certain disruptive tendencies."

The explanation of all conduct is desire growing out of the various forms taken by the two fundamental instincts, self-preservation and sex. The former of these leads to constant attempts to control the environment, physical and social. Those who feel themselves inferior in the struggle for dominance will normally overcome the resulting feeling of apprehension by special endeavor in some field and may become actually superior. The sex instinct frustrated by social conditions of its normal outlet may lead to all sorts of dangerous substitute reactions. On the other hand, if properly "sublimated" they may become the motive for the highest type of human endeavor, such as art and other creative tendencies.

Such a simple statement as the foregoing fails to describe adequately the elaborate mechanisms which according to the psycho-analysts develop in the child's life, and serve to explain his behavior. Some notion of these may be obtained from the chapter entitled "the family situation." The love of the child for the parent has a sex preference—the boy preferring the mother and the girl preferring the father. The parents' preferences are in agreement with those of the child. Under such circumstances the boy becomes jealous of the father because of the attention the latter receives from the mother, and for a similar reason the girl becomes jealous of the mother. At the same time there develops a desire on the part of the child to emulate the parent of the same sex. These emotional relationships to the parents are very important, the child often developing character traits directly dependent upon them.

This description of family life will seem fantastic to those whose experiences have been limited mainly to the observation of normal healthy children, but it is only illustrative of many similar explanations which the Freudians make of human conduct, with sex always lurking in the background. Indeed, one trembles lest the revelation which they aim to make of our inner selves may by the power of suggestion make the facts and the theory somewhat coincide. Of course the Freudian has a ready reply to this implied criticism but that reply has long since failed to convince or frighten.

In at least one respect, however, a book of this sort may have good results. If it serves in any degree to correct our attitude of prudery towards the problems of sex-education, and leads us to face "the original nature of man" with frankness and sincerity instead of hypocritically ignoring it, a useful purpose will be served.

E. H. CAMERON

WALSH, JAMES J., M.D. *Health through will power*. Boston: Little, Brown and Company, 1919. 288 pp.

This book presents a striking contrast to the one just reviewed. In the psychology of the psycho-analysts, which the author expressly rejects, a wonderfully intricate and complex group of subconscious processes is invoked to explain mental health and disease. Not so here. Will power explains it all. Does a person suffering from incurable disease live longer than the physician expects or is a person with a frail body able, nevertheless, to accomplish much? The explanation is will power.

Will power has preventive and curative effects on coughs and colds, intestinal disorders, rheumatism, tuberculosis, asthma, abnormal functioning of the heart as well as psycho-neuroses and distinctively feminine ills. One must have the will to eat, to neglect pain, to repress dreads and self-pity, and to take exercise.

Throughout the book the will appears as an occult entity not further analyzable but capable of being injected into almost any situation with marvellous results. "By far the greater part of what has come unfortunately to be called the unconscious and the subconscious and that has occupied so much of the attention of modern writers on psychological subjects is really the will at work." It is the old time faculty psychology in its purest form.

Whatever the objections may be to the book from the more strictly psychological point of view it is but fair to say that it is well worth reading. It is full of a commendable common sense unfortunately too uncommon with regard to health and disease. The chapters on dreads, sympathy, self-pity, and avoidance of conscious use of the will are especially illuminating. The book is written in a style which holds the interest of the reader and should win wide appreciation.

E. H. CAMERON

SEASHORE, CARL EMIL. *The psychology of musical talent*. Boston: Silver, Burdette and Co., 1919. 288 pp.

This volume contains a message for two classes of persons, the student of the psychology of music and the teacher or supervisor of music in public schools. To the former the book will give a summary of the work of the author and of his students and associates in the psychological laboratory of the State University of Iowa—a laboratory which is “devoted largely to the study of the psychology of music.” To the latter it will give scientific information concerning musical talent that has definite practical values.

Professor Seashore has analyzed the capacity required for learning to produce music. This analysis he calls “an inventory of the musical mind.” Two coordinate bases of classification are used: first, the attributes of sound (pitch, intensity, duration, and extensity) and second, those traits of the human mind which are necessary for the apprehension and expression of the recognized attributes of sound (hearing of tones, production of tones, the representation of tones in memory and imagination, musical thought, and musical feeling). As a result of this analysis 25 “musical talents” are listed.

As one result of this study of the psychology of music, the author has made available instruments for the group measurement of six musical talents: (1) sense of pitch; (2) sense of intensity; (3) sense of time; (4) sense of consonance; (5) musical memory; and (6) musical imagery. Each of the tests may be given to a group of pupils in a half-hour period. The author recommends their use in the fifth grade as a preliminary survey and again in the eighth grade in order to advise pupils concerning the avocational and vocational pursuit of music.

Possession of these talents is a prerequisite for certain types of musical achievement. Since, for the most part, they represent native equipment rather than the results of training, measures of them in connection with other information furnish a very reliable basis for the vocational and avocational guidance of school children. The furnishing of a basis for such guidance rather than the measurement of musical ability or of the results of teaching is the real function of the tests.

The volume is a very important contribution in the field of applied psychology. Concisely stated paragraph headings materially assist the reader. Portions of the book, however, do not appear to be well balanced because of the brevity of the treatment of certain topics and the elaboration of others. This is no doubt due in part to the undeveloped character of the field.

In general the book is weak in the presentation of data, but strong in keenness of analysis and interpretation. The graphical charts are below present-day standards. Practically none of them can be read without looking up the notation in the text, and in many cases it is necessary to turn to another chapter to get this information.

It is seldom that a fundamental treatise, such as this volume is, fails to include a carefully prepared bibliography. This book contains no bibliography and the footnote references are frequently of the “*op. cit.*” type. Neither is there an index. The elaborate topical table of contents partially takes the place of this but not entirely. The responsibility for these defects and the one concerning the graphical charts should be shared by the editor and publisher of the book. It is announced as the second volume of the Beverly Educational Series and it is hoped that such defects will be eliminated from future volumes.

W. S. M.

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Walter S. Monroe, University of Illinois, Urbana, Illinois.

Director Chas. L. Harlan of the Bureau of Educational Tests, Standards, and Measurements writes that he has just returned from a tour **Idaho Bureau** through the state of Idaho in which he gave, scored, tabulated, **at Lewiston** and interpreted both educational and intelligence tests in ten cities and to more than twenty thousand children. The tests used were Monroe's Standardized Reasoning Tests in Arithmetic, Courtis Standard Research Tests, Series B, Charters Diagnostic Tests in Language and Grammar, Woody Arithmetic Scales, Haggerty Intelligence Examinations, and the Otis Group Intelligence Test.

At the recent meeting of the Department of Superintendence at Cleveland a new educational organization was launched that is known as the **Directors of Supervised Student Teaching** National Association of Directors of Supervised Student Teaching. The purpose of the organization is expressed as follows in the preliminary announcement.

"The dominant purpose of the association will be to test out in the training school the principles of psychology and education taught in the professional courses offered in the training department of the institution, with the view of eliminating such instruction as will not stand the test of sound practice. This will mean the complete unifying, harmonizing, and simplifying of the whole scheme of supervised student teaching."

The Southern California Educational Research Association was organized in December 1920. Its purpose is stated as follows: "(1) To discuss the value and use of standardized tests and statistical measurements; (2) To construct new tests and measurements as the need arises—these to become the property of the Association and not for private gain; (3) The study of such other phases of Educational Research as may be desired by the Association."

It was decided to hold meetings every two months in Los Angeles, and the following officers for the year 1920 were elected: Dr. W. Franklin Jones, President; Dr. A. H. Sutherland, Vice-President; Miss Mary Bess Henry, Sec'y-Treasurer. A charter membership of forty-three seemed very encouraging for the future of the association.

Mr. Ernest Branson, Director of Research at Long Beach, spoke at the January meeting on "The Organization of a Department of Research in a Small City." Mr. Branson also gave an interesting report on the results of intelligence and educational tests in the Long Beach schools.

March the twentieth, Dr. J. Harold Williams, Director of Research in the Whittier State School, gave an excellent talk on "Clinical Psychology in the Public Schools."

The closing meeting of the year will be in charge of Dr. A. H. Sutherland, Psychologist of the Los Angeles City Schools, who will speak on some important adaptations of clinical psychology in the Los Angeles schools.

The systematic survey of schools or school systems by means of standardized tests is a common method of appraising "efficiency." Relatively little has thus far been done, however, by way of putting together in convenient form groups of tests for this type of use. In planning for a survey the superintendent usually

**Batteries of Tests for School Surveys** orders a variety of tests from a variety of sources; and as a consequence he often gives them in varying order. The directions from test to test are not related, sizes of blanks often vary; and, in order to assemble the results of an extensive survey, several separate blanks must be handled for each child. In order to make the procedure in survey work more systematic and convenient, Dr. and Mrs. Pressey of Indiana University have recently put together, in four-page folder form two batteries of standardized tests: (1) an examination for the junior high school and (2) an examination for the second grade.

1. The examination for the junior high school consists of four tests, one on each page of the folder. The first page gives a test in American history, the questions being selected from the Bell and McCollum test material.<sup>1</sup> The second page consists of the Starch Arithmetic Test A,<sup>2</sup> slightly rearranged for use in grades six to eight. On the third page is presented an examination in geography, the questions being selected from the Hahn-Lackey Geography Scale. The fourth is a test of English.<sup>3</sup> The scale thus gives one test in each of the four "promotion subjects." The timing is very simple, eight minutes to each test.

2. The second-grade scale consists of a similar folder. On the first page are spaces for writing in twenty words from the Ayres spelling list. The second page presents a test in reading vocabulary. It consists of 24 lines, in each of which there is one real word and four nonsense syllables, thus, "suntrel winter bolun omute ortuni." The child is told to "find the real word and draw a line around it." The third page contains two tests, one in the fundamental addition combinations and one in the corresponding subtraction combinations, the test being exactly similar to tests A and B of the Cleveland Survey Scale.<sup>4</sup> On the last page is a test of the understanding of sentences; there

<sup>1</sup> Bell, J. C. and McCollum, D. F. "A study of the attainments of pupils in United States history," *Journal of Educational Psychology*, 8:257-74, May, 1917.

<sup>2</sup> Starch, Daniel. "Scale for measuring abilities in arithmetic," *Journal of Educational Psychology*, 7:213-22, March, 1916.

<sup>3</sup> The test consists of nine compositions written by school children, selected from Thorndike's list of 150 compositions, published by Teachers' College in 1916. The compositions have all been rated on the Hillegas Scale and have values running, by fives, from 30 to 70. The compositions are presented in a random order and the children are told to number them in order of value. The score is in terms of deviations from the correct order.

<sup>4</sup> Judd, C. H. *Measuring the work of the public schools*, pp. 95-96.

are again 24 lines, each consisting of a sentence with one word too many, thus, "She likes clock to swing up and down." The child is to cross out the extra word.

The two batteries of tests have been carefully standardized by use in the survey of the school systems of three Indiana cities and may now be obtained for general use. The blanks have a decided convenience as there is only one blank to handle for each child; and they make a survey more systematic, since the tests are always given in the same order. And, by a simple transmutation and combination of the scores on the separate tests, an "achievement total," or single numerical statement of general school attainment, may be obtained for each child.

The examinations are designed primarily for school survey work. However, the authors have conceived them as particularly useful for certain other purposes. (1) They should give a means of measuring, not merely progress in a particular subject, but attainment as a whole; and they should thus make possible a synthetic statement of the educational status of each child, in a much larger and more comprehensive way than would otherwise be possible. (2) It should be similarly possible to appraise teaching, as a whole. (3) Finally, by the combined use of such scales and a scale of intelligence it should be possible to set over against each other general ability and total achievement and hence to evaluate what a child has done with relation to what he should be able to do. Similarly it is possible to evaluate a teacher's success with due regard to the quality of "pupil material" with which she has had to work.

Is there a minimum standard which we have a right to set for rural teachers in locational geography of the United States? Should a teacher who expects to teach all the geography from first grade through the eighth be able to locate any state of the Union on the map? Should she be able to tell the state in which the thirty principal cities of the country are located, not by naming the state, but by placing a number opposite the name of the city which number occurs on the state in which the city happens to be?

**The Scores of a  
Group of Rural  
Teachers on Curtis  
Standard Supervisory  
Test in Geography**

Without attempting to answer the questions above, I desire to give the results of a test of the performance of a group of about one hundred rural teachers in an Iowa county which I must not call typical. It is not typical in that it contains a teacher training institution, and has within its borders one of the leading industrial cities of the Middle West, as well as another good sized town of several thousand people. Such a county is not, of course, typical of Iowa counties. The Curtis Standard Supervisory Test in Geography was given at a teachers' institute. The teachers were not asked to sign the papers. Eighty-six papers were returned. On the location of the forty-eight states the results were as follows. The median number of states located correctly is 40, the extreme variation being from 13 correct replies to perfect scores, of which there were two. Of the total,

2 graded between 10 and 14			
5	"	15	" 19
10	"	20	" 24
8	"	25	" 29
7	"	30	" 34
11	"	35	" 39
24	"	40	" 44
19	"	45	" 49

Twenty-eight papers were unfinished. With these, all states after the last one marked in the list are not counted "omitted." The District of Columbia is most frequently omitted, having been avoided by 32 writers. It was misnumbered by 18, most of these mistakes being the placing of the District in either Maryland or Virginia, usually the former. (However, one teacher placed Washington in Iowa. And of course, there is a Washington in Iowa.)

Of the states, Delaware is the most puzzling Will o' the wisp. It was omitted by 9 teachers, and missed by 28. It seems to be confused with New Jersey very frequently. This usually makes for a mistake in the placing of New Jersey, which is second in the list, with 30 errors. Another eastern state, New Hampshire, shares third place with Colorado and Kansas, each with 28 errors. New Hampshire is often interchanged with Vermont, on which there were 25 mistakes.

I shall not go into detail as to number of errors with other states. There were 16 missed 20 times or more, while 11 were missed 10 times or less. California, Maine, and Florida were each missed by one teacher. Iowa, strange to say, was misnumbered or omitted by 4. States contiguous to Iowa stand low in the scale of errors, Minnesota with 5, Wisconsin with 8, Illinois with 2, Missouri with 14, Nebraska with 14, and South Dakota with 16.

It is evident that with some states there is ease in remembering "outstanding" locations—"something to fasten to." Witness California, Maine, Florida, each missed once, and Texas not all. Rhode Island was misnumbered 22 times.

On the whole, the errors of teachers seem to fall into two comparatively easily distinguishable classes; first, the interchange of poorly oriented outlines, as Vermont and New Hampshire; Connecticut and Massachusetts; Washington and Oregon; New Mexico and Arizona; New Jersey and Delaware; second "random shots" or "bonehead mistakes"—to use a term from athletics. There is often indication that the subject has no idea as to location, making a mere guess at it; while in other cases he seems to be under a mistaken impression, perhaps judging more by shape than by locality.

Among the cities, Washington is most often misplaced or omitted, having been missed by 49 teachers. Many of these errors are due to placing the capital city in Maryland, which shows a knowledge of its whereabouts, but not an accurate one. Savannah stands second, with 35 errors, and Duluth third with 32. No teacher mislocated or omitted San Francisco; all other cities were misplaced or omitted by at least 3 people. Mislocations of cities sometimes correlate with errors in states, and sometimes not. For instance, one teacher gives Kansas the number properly belonging to Nebraska; she is likely to place opposite to Kansas City the Nebraska number which she mistakes for that of Kansas. Many writers placed Rochester in Minnesota. This was accepted for the great hospital at that point has given the Minnesota Rochester a reputation equal to that of the larger city of New York, and superior to it in the Middle West. Strange to say, some people make mistakes in numbering a state, but when they come to a city within that state, get it correct.

The scores for cities were as follows, in groups of 2:

2	scored	7 or 8
1	"	9 or 10
1	"	11 or 12
5	"	13 or 14



3	"	15 or 16
13	"	17 or 18
4	"	19 or 20
5	"	21 or 22
12	"	23 or 24
18	"	25 or 26
14	"	27 or 28
8	"	29 or 30

The median is 23 or 24.

I expect to continue this work as opportunity offers; and to suggest methods of improvement to teachers.

FRED D. CRAM

*County Superintendent, Mason City, Iowa.*

Dr. Buckingham's article, "Index of Efficiency in Teaching United States History" in the March number of the *Journal* challenges the expert scale maker.

"May I not" assume that his core-syllogism is something like

**Wanted:** this, disregarding the preliminary analogies from science:

**A History** (a) The Champaign-Danville tests were Van Wagenen's.

**Scale Maker** (b) Van Wagenen's questions are nearly all essentially fact questions, etc., and, inferentially (p. 169) are not adequate for testing the "higher abilities" they presume to be designed for.

(c) Correlations made show that knowledge of facts is symptomatic of "higher abilities." (Knowledge of facts "conditions" these higher abilities. Granted. Unanimous vote.)

Therefore: Fact question scores correlate positively with pseudo-think-but-really-fact question scores.

(The examination of scores made in New York and Madison was the product of test-questions that Dr. Buckingham did not describe, and therefore cannot fairly be considered here.)

The conclusion is penultimately stated on p. 169—the "even-bet" phrase tempts me to say "ante-penultimately." It is: "Whatever may be the desirable outcomes of the teaching of history, it does not appear to be necessary that a valid test should require reactions with reference to all of them. It may merely require reactions which are symptomatic of them."

Does this not challenge discussion if not dissent? In the first place (the "even-bet" phrase again lures) is it not a case of passing the buck? Is not the inference just this: that "Van Wagenen is the first maker of a thoroughly worked out scheme" etc.; that the use of his largely pseudo-think test questions *indicates* that correct fact answers are symptoms of higher abilities, *but not valid evidence* of the same; and that so far we have no series of valid tests for the purpose.

The writer, of the laity so far as the N. A. D. E. Research is concerned, persists in his innocent faith that here is a field for work—that valid tests *can* be made; that at least, questions so far removed from the abstract factual as to justify an examination of the relation between memory of facts and *actual* attainment of the higher abilities, can be framed.

If I am correct in this, and there *can* be shown a fairly high positive correlation, *then* we shall indeed "be justified in measuring historical ability by means of the ability to answer fact questions" (p. 165). And if there *cannot* be shown a high positive correlation, then two series for the two different main objectives—facts and higher abilities—should be used, or at least two sets of measures obtained from one series of questions.

Now this presupposes as Dr. Buckingham implies, that we must define "historical abilities" and agree upon the definition. Without now suggesting a definition, let us see if one cannot be "felt" or sensed in the examination of a few questions and topics—for the writer, not of the laity so far as teaching history is concerned, has preponderant proof from his own experience and that of his teachers that "if, after giving a fact test, we should desire to know how capable the pupils probably would be in other (i.e., higher abilities) ways," we may *not* infer this "without giving any other test." Fact knowledge does not always or necessarily "carry over" into historic perspective, sense of significance of events, etc., etc. (p. 167).

Consider the following question: (A) Daniel Webster was at one time against a protective tariff and later favored protection. John C. Calhoun at one time was a protectionist and later vehemently opposed protection. Jefferson was a strict constructionist and yet favored the purchase of Louisiana; the Federalists were liberal constructionists, and yet opposed it. The Democratic party until recently was a states rights party; and New England republicans until recently were opposed to the states rights idea. What conclusion do you draw regarding political principles and theories?

Here is a question in which the *facts* are furnished gratuitously. The "higher ability" is to induce the law that—politics is full of inconsistencies; that political theories are really almost solely actuated by personal, local, selfish interests.

(B) Or take this: Suppose Champlain in 1608 had chanced to befriend the Mohawks (Iroquois). What would probably have been the results of the New York campaign of the French in 1758?

(C) Or take any text—Woodburn and Moran, Forman, Hart, Fite, any of them—and examine the "suggestive questions" usually given. Can it not fairly be said of many of them that (1) some are 90 percent fact; (2) some call for "thinking which has no *necessary* reference to history"; while (3) others demand thinking which does make a demand upon the "higher abilities"?

The answers may be *fact* answers, to be sure. But the pupil must go-a-fishing for them; he must examine, weigh and accept or reject facts; he must then organize them. And that requires staunch thinking.

Does these facts that he selects have "a *necessary* reference to history?" It would appear so.

From which I *persist* in my innocent faith that a job is looking for a taker; and *insist* that it would be very unsatisfactory to test for facts only and continue to *estimate* subjectively by inference of problematic symptoms, the capabilities of pupils to achieve the "higher abilities" that good history teachers desire for them.

F. S. CAMP

*Superintendent of Schools, Stamford, Conn.*

# National Association of Directors of Educational Research

(E. J. ASHBAUGH, *Secretary and Editor*)

The last issue before summer vacation. The past year has certainly been one of great advance with the members of the association. Every letter from individual members, as well as conversation with those whom the secretary has seen, has breathed the spirit of optimism regarding the progress of our work. The fields of activity open to us, whether working in a city system or in a state-wide, are a challenge to the utmost effort which we can put forth. Most of us will have closed the regular year's work before the coming of this issue of our Journal. Let us summarize the results of the past year, lay out a big program for the coming year, and notify the secretary that these programs may be printed in the first issue of the Journal next fall.

Only a few members have sent in any statement of their recent work. Miss Brown, Director of Measurements in Denver, reports particularly interesting work in intelligence testing in the primary grades and in the junior high school. She has also given the Henmon Latin Test to all pupils who have had one or more semesters of Latin for the purpose of making a comparison of the teaching of first-year Latin in junior and senior high schools. City-wide tests in reading and arithmetic given in the first semester are to be repeated in May.

Miss Mallory at Beaumont, Texas, reports the repetition of standard tests with about twenty-five hundred children. This is the first testing that has been done in Beaumont and some very interesting results have been secured. Both Miss Mallory and Superintendent Moore feel that the tests given during the first semester gave them a better insight into the condition of the schools, than they could have secured in the same length of time in any other way.

Professor W. A. McCall reports that he will have an article in the next issue of the *Teachers College Record*, entitled "How to Compute the Median." This will doubtless be of great interest to members of the Association, especially in view of the fact that a report was made by Mr. Courtis at the Cleveland meeting in behalf of the committee on standards which took up this same problem.

Dr. Woody of the University of Washington reports that he has received material for various phases of a reading investigation carried on in six of the largest cities of the first class in the state of Washington. Monroe Silent Reading was given to all the children in the systems and Thorndike Paragraph Reading to children in three buildings in each city. An extensive questionnaire on school room practice was sent out at the time the testing was done. In addition to this he is still continuing his investigation of reading-arithmetic exercises and is attempting to develop some school tests for differentiation of pupils in the seventh grade, according to ability.

Dr. Greene and your secretary have conducted an extensive investigation of the salaries of Iowa teachers in relation to their preparation, experience and tenure. A report on salaries was sent to each member of the association some time ago. A report on the relations of salaries, training, experience and tenure was made at the Sixth Annual Conference on Supervision held by the University of Iowa this spring. The report will be published in the organ of the State Teachers Association and a copy will be sent to each member as soon as it is in print.

We are also collecting the results of testing over the state with the four most widely used standard tests. These tests are: Curtis Series B Arithmetic, Monroe Standardized Silent Reading, Curtis Silent Reading, and Greene's Organization. Tabulations for the state on these tests will be available next fall.

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An extensive study of teachers' salaries in Wisconsin has been made by Dr. Theisen and Mrs. Flemming. They have doubtless been busy on many other problems, but have failed to report to the secretary in detail.

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If the association has failed in any sense this year, it has been in the fact that we have not kept closely enough in touch with each other. From a few members repeated calls from the secretary have failed to secure a response regarding their work. Of course you are busy. But do you not like to know what the other members are doing; what tests they are trying out, and what unique things they are attempting to do? Of course you do. So would all the rest of us like to know more about what you are doing. Let each one resolve to furnish the secretary, not only with the program asked for above, but also with one or two reports, at least, during the year of progress on these programs.

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VALUABLE ARTICLES TO APPEAR IN EARLY ISSUES OF THE JOURNAL OF EDUCATIONAL  
RESEARCH

Comparative Results in Intermediate and Elementary Schools at Los Angeles by *Thomas H. Briggs*.

Survey of the Reading Tastes of Children by *Harriet S. Wardell*.

Grade Norms for the New York City Penmanship Scale by *Eugene A. Nifenecker*.

Use of Group Mental Tests in the Guidance of Eighth-Grade and High-School Pupils by *Virgil E. Dickson*.

Provisions for Individual Differences in the Teaching of Reading by *W. W. Theisen*.

Use of Psychological Tests in Vocational Guidance by *W. M. Proctor*.

Standardizing Procedure in Combination Systems of Supervised Study by *W. H. Hughes*.

Geography Testing in Boston by *Harriet M. Barthelmess*.

Third article on "Putting Standardized Tests and Scales to Practical Use in Rural Schools" by *S. S. Brooks*.

Scale of Attainment No. 1 by *Luella W. Pressey*.

Educational Measurement in the Field of History by *Charles Harlan*.

Comparative Study by Educational Measurements of One-Room Rural-School Children and City School Children by *J. C. Chapman* and *E. L. Eby*.

# Journal of Educational Research

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## A TESTING PROGRAM FOR ELEMENTARY SCHOOLS

B. R. BUCKINGHAM AND WALTER S. MONROE

*University of Illinois*

Most of us are agreed that tests, in order to produce the best results, must be given by teachers. Only in a few school systems can they be administered either by the superintendent in person or by some one acting for him. Simple tests, therefore, will be in greatest demand—tests which are easily administered, objectively rated, and quickly interpreted. Monroe's Standardized Silent Reading Test and Curtis' Standard Research Tests in Arithmetic have been widely used largely because they possess these characteristics of simplicity. The test-maker's art is most clearly revealed when he is able to devise tests which are not only simple but valid as measures of significant school abilities.

The superintendent, therefore, who contemplates initiating a testing program, or even the continuance of one already begun but not carried forward to a point where teachers have become relatively expert, will do well not to be too ambitious in the selection of the number and character of the measuring instruments which he will use. In a certain sense he will have to "sell" the idea to his teachers. He cannot do this if he imposes upon them a confusing and difficult task. It is better for him to select a few tests, each concerned with important activities, than to try to cover a wide range of school subjects. One or two tests carefully administered and competently followed up will satisfy and convince; many tests may do no more than confuse and antagonize.

This would seem to be particularly true in the case of rural schools. When, therefore, the Illinois Association of County Superintendents appointed a "Committee on Standard Tests" and when this committee, pursuant to instructions, met with us to plan a rural-school testing program, we were at once convinced

that such a testing program would have to be simple. Even if general considerations had not dictated such a policy, the relative inexperience and lack of training of rural-school teachers in administering tests would have convinced us that we should have to be content with small beginnings.

At the same time we recognized that the opportunity was unusual. The testing of rural schools on any considerable scale has not been attempted. Their isolation prevents, except at prohibitive cost, the employment of special examiners. Quite generally the teachers have no experience in giving tests; and the long-range supervision of the county superintendent necessarily precludes the careful oversight which alone can surmount these obstacles. More favorable conditions have for the most part confined the test movement to city systems. Yet it is unquestionably true not only that the rural schools ought to be tested, but that they are in a position to profit by the testing to a peculiar degree. The mere fact that the grades are all under one teacher facilitates any regrouping of children which the results of testing may suggest. Moreover, these grades are, or may be, loosely organized. A child may easily—far more easily than in a graded school—be instructed with one grade in one subject and with another grade in another subject. For these reasons and for many others we were eager to meet the county superintendents in their proposal to test the rural schools of the state.

When the committee met with us, we proposed first, that not more than two educational tests should be used; second, that these tests should be in the most important subjects—i.e., reading and arithmetic; third, that if it were in any way possible, the intelligence of the children should be measured; and fourth, that the pupils' scores in the educational tests on the one hand and in the intelligence test on the other should be definitely related to each other. To these suggestions the committee readily agreed.

But what reading test, what arithmetic, and, above all, what intelligence test should we use? As to the reading test there was not much chance for argument. If we were going to have something simple, we should clearly want to use Monroe's Standardized Silent Reading Test or some test of that character. In arithmetic we first considered Curtis' Standard Research Test, Series B; but we afterwards rejected it in favor of two series of

tests, one for grades III, IV, and V, and the other for grades VI, VII, and VIII. This action was taken because of the varied types of examples which such a plan would provide. The selection of an intelligence test constituted the chief problem. Although we now believe that our rural-school program of testing has a wide and general usefulness, it is well to point out that in our relations with the county superintendents our attention was narrowed to the particular project in hand. Since, therefore, the money available for testing in each county was limited, we were obliged to select an inexpensive intelligence test or face the fact that very few superintendents would be able to undertake our program. But no cheap intelligence test seemed to be good enough for our purpose. In fact, we were confronted by the condition—common enough in these days—that the thing which was good enough to be desirable was also too expensive to be had.

The only way out of the difficulty seemed to be the devising of a new intelligence test. Of course, the expense of such a procedure, when combined with that of printing and distributing, might well be greater than the expense of purchasing tests already on the market, but the cost of devising the intelligence test would be a legitimate part of our cooperation with the superintendents. Our final proposal was, therefore, that we would make up a battery of tests in reading, arithmetic, and intelligence, and that we would print all the material in one booklet. The advantages of bringing the material together in this way hardly need be pointed out. By this means a pupil's record on all the tests would be kept together, and the calculation of certain derived measures (to be explained later) would be facilitated.

This battery of tests we agreed to devise, standardize, print, and distribute in quantities sufficient for the use of the rural schools of the state, and to have it ready for them when they opened in September. Moreover, we agreed to prepare a handbook of instructions to teachers, and to have it printed in time for use at a county superintendents' convention to be held at the University of Illinois on the twenty-ninth and thirtieth of July.

This entire project was rendered especially difficult because the school year was already far advanced. The Committee on Standard Tests first met with us on April 2, 1920. The decision to devise and print a testing instrument for use in the rural schools

was not reached until about ten days later; and the time required for printing the tests and for delivering them to superintendents—delayed as delivery was by railroad strikes—carried us well into May. Even with plenty of time at our disposal, the making of a new intelligence test would not have been a task lightly to be undertaken. Such work involves careful investigation of existing material, the formulation of preliminary editions, a try-out on thousands of children, and endless statistical work, typing, mimeographing, and printing. Nevertheless, such a course of action seemed necessary in order to save the situation.

By making a special effort, and with the effective cooperation of a number of Illinois city superintendents, we were able to carry out our plans. Of the intelligence test we used two preliminary editions and of the reading test one. The arithmetic test is a composite of material of known difficulty mostly from Monroe's Diagnostic Test. The final edition of the test booklet is now coming from the press. It consists of 200,000 copies and over 100,000 of them have been spoken for. The teacher's handbook is likewise ready.

In the compilation of the "Illinois Examination," as we have called this group of tests, we do not claim to have displayed any particular originality. Certain materials both for intelligence and educational testing are to be had for the asking, and such material we have used. In this respect we resemble Homer as represented by Kipling in his introduction to the "Barrack-room Ballads":

When 'Omer smote 'is bloomin' lyre,  
He'd 'card men sing by land an' sea;  
An' what he thought 'e might require,  
'E went an' took—the same as me!

Even if time had permitted us to originate all the material of which the tests are composed, it is doubtful whether our time would thus have been most serviceably employed. At any rate, we have preferred to be useful first and original afterwards.<sup>1</sup>

The "Examination" appears in two parts, and is accompanied by record sheets and the handbook of instructions to which we

<sup>1</sup> Dr. Sidney L. Pressey kindly permitted us to use his tests of Verbal Ingenuity and Arithmetical Ingenuity. Professor E. H. Cameron contributed the Substitution Test.



have referred. Part I is for grades III, IV, and V. It comprises the following material:

1. *The Intelligence Test*, consisting of sub-tests in analogies, arithmetical problems, sentence vocabulary, substitution, verbal ingenuity, arithmetical ingenuity, and synonym-antonym.

2. *A Revision of Monroe's Standardized Silent Reading Test for Grades III, IV, and V.*

3. *A Test of Ability in the Operations of Arithmetic*, consisting of eight sub-tests—four on the combinations, and four involving simple examples in each operation.

Part II is for grades VI, VII, and VIII. The intelligence test is the same as in Part I. The reading test is Dr. Monroe's revision of his Standardized Silent Reading Test for grades VI, VII, and VIII. Although this material differs from the reading material for Part I, the instructions are in every way the same. The arithmetic test consists of seven sub-tests as follows: column addition, long multiplication, long division, subtraction, addition and subtraction of fractions, multiplication and division of fractions, division of decimals.

The silent reading test yields measures of both rate and comprehension. For the operations of arithmetic, it was considered desirable, however, to have a single score which would serve as an index of the pupil's achievements. This was secured merely by taking as the pupil's score on each test the number of examples right. These scores were then added after certain adjustments had been made to equalize the weight given to the several tests. The sum thus obtained was the pupil's point score on the operations of arithmetic.

The actual working time of pupils is 27 minutes for Part I and 37½ minutes for Part II. The total time required for giving either of the two parts is about the same—namely, one hour. It is recommended that Part I be given in two separate periods, but that these periods be included in the same half-day session. This is clearly advisable because all the pupils who are present at one test period will then be present at the other.

It is clear that in a rural school (or in a graded school in which children of the fifth and sixth grades meet in the same room) both parts of the examination will have to be administered by the same teacher. This, however, does not mean that two hours of the teacher's time need be devoted to the task. The same preliminary

statement to children and the same intelligence test are used for all grades. Moreover, although the material in the reading tests differs for the two groups of grades, the instructions are identical, and all children may, therefore, be tested simultaneously. Accordingly, the teacher who is giving both parts of the examination may administer them together so far as the intelligence and reading tests are concerned.

The union of intelligence and subject-matter testing has obvious advantages; and these advantages will naturally be more surely obtained if, as in this instance, the intelligence and subject-matter tests are mechanically combined—i.e., form parts of the same testing instrument. But even then the advantages cannot be fully realized unless some easy way is found of combining the scores on the several tests. If the Illinois Examination presented no characteristics other than those we have mentioned above, we should hardly be justified in devoting this article to it. It is, however, in the treatment of scores that the examination is truly distinctive.

The sum of the scores obtained by a pupil on the sub-tests of the intelligence scale yields his "point score" for that scale. On the basis of our returns, we have ascertained for each half-year of age the median point score on the intelligence test. The point score of a pupil may then be interpreted with reference to these medians. For example, it is found that 97 is the median point score of children 14 years of age; accordingly, a child whose score is 97 indicates by his performance a mentality which is typical of that age. Fourteen may then be said to be his "mental age."

This conception of mental age is valuable—much more so than that of chronological age. It indicates the degree of mental development which the child has attained at the time the test is given. Since school work addresses itself primarily to mentality, it is, so to speak, the efficient age with reference to school work. Indeed, it may without much inaccuracy be defined as the present ability to learn. It is, therefore, far more important as a basis of action than the number of years a child has lived.

In childhood, however, mental age like chronological age is constantly changing; but unlike chronological age, its change is not registered merely by the flight of time. For a basis of action which contemplates a continuing educational program, we need

some determination (derived if possible from the point score) which shall be relatively unchanging over a period of years. It has been found that one form of relationship between a child's mental age and his chronological age fulfills this condition. This relationship is expressed by dividing the mental age by the chronological age, or stated another way, by finding the percent that the mental age is of the chronological age. The result is called the "intelligence quotient" (I. Q.). Thus, if a child's mental age as determined from his point score is 9 years and his chronological age is 12 years, his I. Q. is 75.<sup>2</sup> This expresses the fact that during the 12 years that this child has lived his annual mental development has been but 75 percent of normal. In other words, each elapsed year of his life he has developed mentally but three-quarters of a year. On the other hand, if this child of 12 had a mental age of 15, his I. Q. would be 125. This would indicate an annual mental development amounting to one and one-fourth years. An intelligence quotient of 100 arises from the fact that mental and chronological ages are the same. It shows that mental development is normal. Moreover, since the I. Q. is relatively constant, these percents of development will continue to manifest themselves. This fact affords a basis of prophecy. We may be sure, for example, that certain children cannot advance beyond the sixth or seventh grade; and they should, therefore, have a modified course of study with reference to that fact. On the other hand, we may be reasonably confident that certain children can, if we let them, finish the elementary school while they are still young. It is our duty to plan for them a richer curriculum and an accelerated progress. If their intelligence quotients indicate that they are advancing mentally at a more than normal rate, then they should be advanced in school at a corresponding rate.

In order to make it unnecessary for teachers, when using the Illinois Examination, to compute mental ages and I. Q.'s, we have provided as part of the accessory material a table of which Table I is a section. Its use may be illustrated by supposing that an eleven-year-old child achieves a point score of 57. Note that the entry "57" in the first column is written opposite "10-0" in the second column. This indicates that the pupil in question has a mental age of 10 years. Since the child is 11 years old, note also the column under "Chronological Age" which is headed "11-0."

<sup>2</sup> Conventionally, the quotient is multiplied by 100 to get rid of the decimal point.

By tracing this column to a position opposite the point score of "57," the entry "91" is found. This is the I. Q. of the child in question.

TABLE I. INTELLIGENCE QUOTIENTS

Point Score	Mental Age	CHRONOLOGICAL AGE				
		10-0	10-6	11-0	11-6	12-0
82	12-6	124	119	113	109	104
77	12-0	120	114	109	104	100
72	11-6	115	109	104	100	96
67	11-0	110	105	100	96	92
62	10-6	105	100	96	91	88
57	10-0	100	95	91	87	84
52	9-6	95	91	87	83	80
47	9-0	90	86	82	79	76

The most distinctive characteristic of educational tests has been the fact that they have been standardized. It has not, however, been generally recognized that our present standards apply only to the median or average scores of a group (usually a grade) and not to the scores of individual pupils. It is true that individual scores may be compared with our present grade standards, but only very limited conclusions may be drawn. For example, the fifth-grade standard for Monroe's Standardized Silent Reading Test for comprehension is 21. The scores of a typical fifth-grade class will range from about 10 to 30. If the median score is 21, we say that the *class as a whole* is up to standard although half of the pupils are above the grade standard and the other half are below it. We do not know whether any particular pupil has done as well as he should or not. A pupil may fail to achieve as high a comprehension score as his intelligence (mental age) indicates he should, and at the same time he may have a score above the grade standard. In other words, a bright pupil may be "above standard for his grade" but below *his own* standard. The opposite also is true. A pupil who has a score "below standard for his grade" may have made a very high score in comparison with his intelligence.

The need for individual standards to use in interpreting the scores of individual pupils is particularly urgent when educational tests are used in rural schools because the number of pupils in any one grade is generally so small that it cannot be representative. Not infrequently there are only two or three pupils. In such cases the median score can have only a very limited signif-

icance. This makes the interpretation of the scores of individual pupils imperative and for doing this individual standards are necessary.

A standard score is the score which a pupil should make on a given test. In the case of silent reading and the operations of arithmetic, two obvious factors, upon which the score which a pupil should make depends, are his intelligence or capacity to learn and the amount of his training or roughly the school grade he has attained. The data obtained by giving both the intelligence test and Monroe's Standardized Silent Reading Test to several thousand children indicated that the amount of instruction which the pupil had received contributed very little to the score which he made on the reading test. It was found that the average silent reading score is approximately the same for pupils of a given mental age whether they are in the third grade or the eighth. For this reason it was deemed appropriate to standardize the educational tests of the Illinois Examination on the basis of mental age. Accordingly, the scores of all pupils of each mental age were assembled and the median taken as standard.<sup>3</sup> In this way, the standard for each half-year of mental age was obtained.

A pupil's point score may now be compared with *his own* standard, i.e., the standard for his mental age. However, it will be more convenient, and will also make possible some other things, if the mental age standards are used to translate a pupil's point score into an *achievement age score* (A. A.). This may be done in the same way as point scores on the intelligence scale were translated into mental ages. When a pupil's score on an educational test (silent reading or the operations of arithmetic) is expressed as an achievement age score, his mental age becomes his standard. Since both his score (A. A.) and his standard (M. A.) are expressed in terms of a common unit, they may be compared by dividing in the same way that his mental age was divided by his chronological age to obtain his intelligence quotient (I. Q.). The quotient of A. A. divided by M. A. we have called *achievement quotient* (A. Q.).

Table II illustrates, for a brief range of point scores and mental ages, the device which we have provided for securing these derived measures. The first line of Table II may be read as follows:

<sup>3</sup> In doing this it was recognized that the educational tests for grades VI, VII, and VIII were more difficult than the ones for the lower grades, and corrections were made in order to adjust the scores of the more difficult tests to the scale of the easier ones.

A pupil whose rate score in reading is 155, whose comprehension score is 12, and whose arithmetic score is 63 shows on all three of these counts an achievement age of 12 years and 6 months. His achievement quotient for each of the three scores is 124 if his mental age is 10 years, 119 if his mental age is 10 years and 6 months, 113 if his mental age is 11 years, *et cetera*.

TABLE II. ACHIEVEMENT QUOTIENTS

POINT SCORES			ACHIEVE- MENT AGE	MENTAL AGE				
Rate	Compre- hension	Arith- metic		10-0	10-6	11-0	11-6	12-0
155	12	63	12-6	124	119	113	109	104
150		60	12-0	120	114	109	104	100
145	11	57	11-6	115	109	104	100	96
140		53	11-0	110	105	100	96	92
135	10	49	10-6	105	100	96	91	88
130		44	10-0	100	95	91	87	84
125	9	40	9-6	95	91	87	83	80
120	8	35	9-0	90	86	82	79	76
114		30	8-6	85	81	78	74	71
107	7	25	8-0	80	77	73	70	67

An achievement quotient of 100 means that the pupil has achieved exactly as well as the average of the pupils of his mental age. If his achievement quotient is 130, it means that he has achieved 30 percent more than the average of the pupils of his mental age; on the other hand, if his achievement quotient is 75, we have evidence that he has achieved only 75 percent as much as the average of pupils of his mental age.

The value of individual standards and the achievement quotient is illustrated in Figure 1. This figure shows the scores for comprehension and the achievement quotients of pupils in a fifth-grade class. The former are plotted along the horizontal axis and the latter along the vertical axis. Each pupil is represented by a dot. Distances from the two axes show the two measures of the pupil's achievement. The grade standard in terms of a point score is indicated by the arrow.

The lowest score in the class is four. If we had only the grade standard, all we could say about this pupil would be that he is below standard and at the foot of his class. His A. Q. shows that in comparison with his own standard he has achieved more than is usually achieved by a pupil of his mentality. In fact

when his mental age is considered, he is one of the "good" pupils in his class.

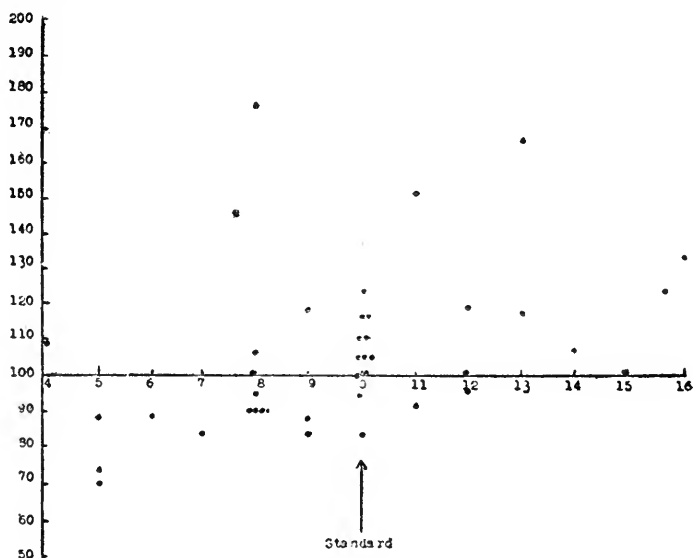


FIGURE 1. SILENT READING COMPREHENSION. RELATION BETWEEN POINT SCORES AND ACHIEVEMENT QUOTIENTS. GRADE V

An added advantage of this plan is that when we have transmuted point scores in subject-matter tests into achievement ages, we have reduced them all to the same units in the sense that each successive year corresponds to an increment of ability gained by typical children in equal lengths of time. Since the achievement ages are expressed in the same units, they may be combined as point scores cannot be combined. For example, we have no obvious way of expressing the total achievement of a child who scores 155 in rate, 11 in comprehension, and 49 in arithmetic. By reference to Table II, however, we observe that these point scores indicate respectively achievement ages of  $12\frac{1}{2}$ ,  $11\frac{1}{2}$ , and  $10\frac{1}{2}$  years. On the assumption that the abilities to which the point scores refer are all equally important, we may obtain the simple mean of these ages, and we may thus express the composite achievement age as  $11\frac{1}{2}$  years.

Clearly, the relation of achievement age to mental age is important. If a pupil's achievement age is more than his mental age, it means that some factors other than intelligence are favorable.

The school is doubtless doing its work well. Of course, there are innate characteristics other than intelligence which may be operative. The most important of these is effort; but since any effort greater than usual is not likely to be elicited except through the superior work of the school, it is probably not inappropriate for the school to take to itself credit for the showing.

On the other hand, if achievement age is less than mental age, the same course of reasoning leads us to suspect that the school is at fault. Of course, this may not be true. For example, irregular attendance for reasons over which the school has no control might produce this result. At any rate, when achievement age is less than mental age—i.e., when the achievement quotient is less than 100—an investigation should be made.

Even if the combination of an intelligence test with subject-matter tests were not necessary to secure individual standards, we believe that any competent testing program should involve both kinds of tests. When the latter are given alone and results are compared with standards, great injustice may be done to the school and to the teacher. If the results are below standard, the teacher and the school are likely to be criticized. This may be wholly unjust. The general level of mentality among the children may be below normal by an even greater amount than the scores in subject-matter tests are below standard. On the other hand, scores above standard in educational tests may not indicate that the school is doing good work because intelligence may be above standard to an even greater degree.

Again, the use of intelligence tests without subject-matter tests is one-sided. The real truth about a pupil or a class is made evident when to a knowledge of mentality is added a knowledge of achievement. If mental age may be taken as representing potential ability, achievement age may be taken as representing *effective* ability. The one shows a child's chance to learn, the other what he *has* learned; the one measures his ability as a possession, the other his ability as put to use. Since achievement age indicates ability as it functions, it affords an important supplement to, and commentary upon, mental age as a basis of action—whether that action involves the reclassification of pupils or some other modification of school procedure. Moreover, it affords, when related to mental age, a stimulus to effort or a basis of satisfaction according as it is less or more than the mental age.



## THE USE OF PSYCHOLOGICAL TESTS IN THE VOCATIONAL GUIDANCE OF HIGH-SCHOOL PUPILS

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The use of psychological tests as a basis for the prediction of probable school success,<sup>1</sup> and in the educational guidance<sup>2</sup> of high-school pupils has been discussed by the writer in previous papers in this Journal. The use of such tests in the vocational guidance of high-school pupils will be discussed in this paper.

### THE EMPLOYMENT MANAGER AND THE VOCATIONAL COUNSELOR

The application of psychological tests to the selection of men for particular jobs is well along in the experimental stage.<sup>3</sup> The employment manager has demonstrated the value of such tests when used in the selection of employees. If the tests are carefully devised to discover whether the applicants have certain essential mental qualifications for the kind of work they will be called upon to perform, and if final selection is made from the few who make high scores in the tests, the results are likely to be satisfactory to the employer. When in addition to specific mental tests, appropriate trade or performance tests are given, the employment manager or personnel expert can select from the highest 25 percent of applicants with reasonable assurance that they will make good at the tasks assigned to them. These tests tend effectively to sift out the undesirables, to reduce the amount of labor turnover, and to secure for the employer a higher grade of employees.

The person who selects men for a particular occupation needs only to know the qualifications for success in that occupation. He can plan his tests with a view to eliminating all those who do not measure up to the established standard. If only five out of one hundred applicants are selected and they all prove to be

<sup>1</sup> Proctor, W. M. "Psychological tests as a means of measuring the probable school success of high-school pupils," *Journal of Educational Research*, 1:258-70, April, 1920.

<sup>2</sup> Proctor, W. M. "The use of psychological tests in the educational guidance of high-school pupils," *Journal of Educational Research*, 1:369-81, May, 1920.

<sup>3</sup> Link, H. C. *Employment psychology*. New York: Macmillan Co., 1919.

adapted to their work the tests by which they were selected are counted as satisfactory. The ninety-five rejected applicants do not concern the employment manager.

The vocational counselor, however, has to think of the ninety-five as well as the five. His field is a broad one. He is called upon to advise people possessing every variety of fitness to enter every possible kind of occupation. It would be manifestly impossible for the vocational counselor to give adequate trade or psychological tests corresponding to the infinite variety of occupations open to American youths.

It is true that he must avail himself of every possible scientific aid in arriving at his conclusions. His preparation will necessarily include a wide knowledge of occupations, and special training in the discovery of occupational aptitudes. But he should never persuade himself or lead others to believe that he is able to chart unerringly their abilities and give them an absolute vocational classification. The successful counselor will understand at the outset that he is a guide and not a dictator, and that he is dealing with probabilities and not with certainties.<sup>4</sup>

#### OCCUPATIONAL LEVELS OF INTELLIGENCE

Among the factors which the counselor must take into account in estimating the probability of a person's success in an occupation, the intelligence level is one of the most important. If we accept Stern's definition of intelligence as a working basis for the discussion of the subject, there can be no question of the vital connection between intelligence and vocational success. Stern says:<sup>5</sup> "Intelligence is a general capacity of an individual consciously to adjust his thinking to new requirements: it is general mental adaptability to new problems and conditions of life." Given a high degree "of mental adaptability to new problems and conditions of life" coupled with energy, persistence, and reliability, it would be reasonable to assume that one's range of possible vocational success would be wide. Conversely given a low level of intelligence, even though the other qualities mentioned are present, one's range of possible vocational success would be greatly restricted.

<sup>4</sup> Kitson, H. D., "Vocational guidance and the theory of probability," *School Review* 28:143-50, February, 1920.

<sup>5</sup> Stern, William. *The psychological methods of testing intelligence*. Baltimore, Warwick & York, 1914, p. 3.

We have already gone far enough in the development of intelligence tests to justify the statement that individual levels of intelligence can be discovered with approximate accuracy. The next step, so far as vocational guidance is concerned, is to discover whether or not there are occupational intelligence levels, i.e. levels of intelligence more or less characteristic of the workers in a given occupation. That there are discoverable differences in the intelligence levels of workers in the various occupations is suggested by the findings of the Division of Psychology, Sanitary Corps, United States Army.<sup>6</sup>

Table I is derived from the chart found on page 23 of the pamphlet, *Army Mental Tests*. The median ratings of this chart are changed from the letters "A," "B," etc. to the raw scores on the Alpha Army Scale (which range from 0 to 212). For each of the 43 occupations selected from the 72 shown on the chart, the median score is given, as well as the range of the middle 50 percent of the scores. The top line of the table would then read: laborers, median score, 35; range of scores made by the middle 50 percent, 21-63. It should then be understood that 25 percent of the laborers scored less than 21 points, while the top 25 percent scored over 63 points out of a possible 212 points. The chart was made up from the returns of approximately 36,500 men, and the data were taken from the soldiers' qualification cards.

Figure 1 illustrates graphically the spread of the middle 50 percent of the scores on Army Alpha by occupational groups. There is considerable overlapping. The unskilled, semi-skilled, and skilled labor groups differ but little as to the beginning of the middle 50 percent of scores (21, 23, and 26 respectively). But there is a distinct difference in the upper limits, which are 63, 70, and 95 respectively. The beginning of the middle 50 percent of the business and clerical group is nearly as high as the upper limit for the unskilled labor group, and the beginning of the middle 50 percent of the professional group is higher than the upper limit of the skilled labor group.

If the scores of the entire number of men examined by the Division of Psychology, Sanitary Corps, of the United States

<sup>6</sup> *Army mental tests methods, typical results, and practical applications*. Washington: Government Printing Office, November, 1918.

TABLE I. OCCUPATIONAL INTELLIGENCE LEVELS, BASED ON ARMY PSYCHOLOGICAL TESTS OF 36,500 MEN. ALPHA SCALE

Occupations	Median Score	Range of Middle 50 Percent
LABORERS (UNSKILLED).....	35	21 to 63
SEMI-SKILLED LABOR		
Cobblers.....	39	23 to 67
Teamsters.....	41	23 to 68
Farm workers.....	42	24 to 70
Barbers.....	43	22 to 70
Horse-shoers.....	44	25 to 70
SKILLED LABOR		
R. R. shop-mechanics.....	45	26 to 83
Bricklayers.....	48	23 to 81
Cooks.....	49	28 to 79
Bakers.....	53	35 to 83
Painters.....	53	31 to 79
Blacksmiths.....	54	29 to 83
Bridge-carpenters.....	55	27 to 84
General carpenters.....	57	33 to 85
Butchers.....	58	33 to 85
Locomotive enginemen.....	59	33 to 82
Machinists.....	61	33 to 86
R. R. conductors.....	62	40 to 84
Plumbers.....	62	38 to 87
Tool-makers.....	63	41 to 88
Auto-repairmen.....	63	41 to 89
Chauffeurs.....	63	38 to 90
Tool-room-experts.....	64	43 to 88
Policemen-detectives.....	64	44 to 89
Auto-assemblers.....	65	44 to 97
Ship-carpenters.....	66	49 to 95
BUSINESS AND CLERICAL		
Telephone operators.....	70	58 to 99
Concrete const'n foremen.....	75	48 to 116
Photographer.....	77	52 to 104
General electrician.....	82	58 to 110
Telegraphers.....	84	59 to 107
R. R. clerks.....	92	66 to 116
General clerks.....	96	74 to 123
Mechanical engineers.....	98	63 to 133
Bookkeepers.....	99	78 to 126
Dental officers.....	106	84 to 130
Mechanical draughtsmen.....	112	79 to 134
Stenographers.....	115	93 to 142
Accountants.....	117	101 to 145
PROFESSIONAL		
Civil engineers.....	125	98 to 147
Medical officers.....	130	101 to 165
Army chaplains.....	150	109 to 173
Engineer officers.....	157	134 to 184

Approximate occupational intelligence levels:

1. Unskilled labor	Median	35,	Middle	50%	21 to	63
2. Semi-skilled	"	42,	"	"	23 to	70
3. Skilled labor	"	61,	"	"	26 to	95
4. Business and clerical	"	96,	"	"	58 to	145
5. Professional	"	140,	"	"	98 to	184

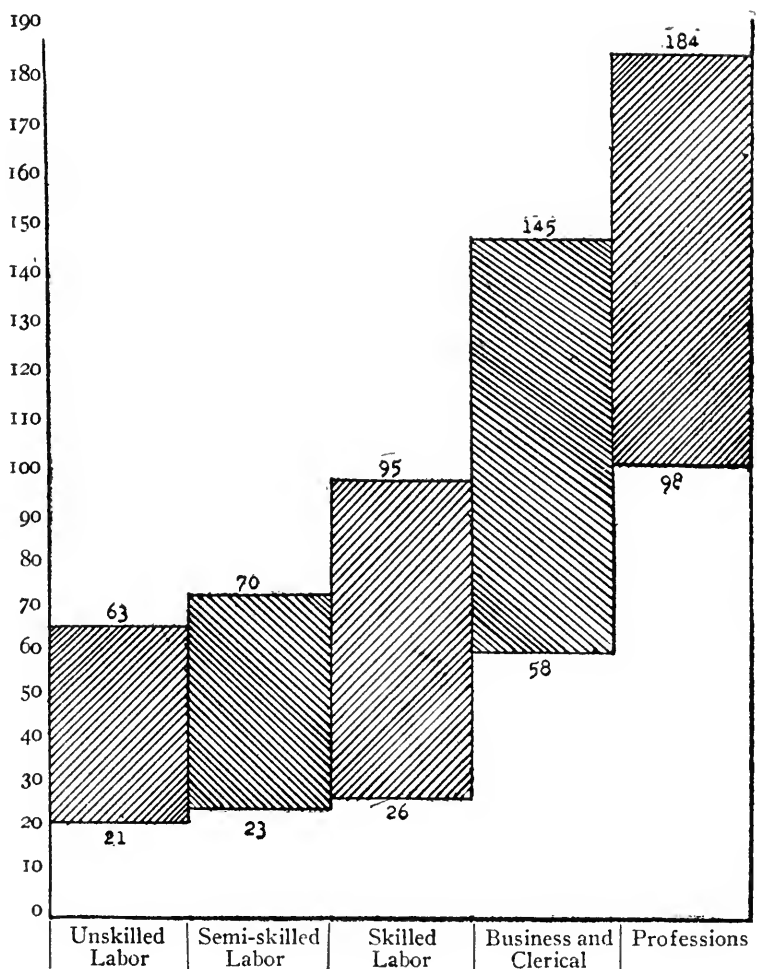


FIGURE 1. SHOWING SPREAD OF MIDDLE 50 PERCENT OF CASES, TABLE I, BY OCCUPATIONS

Army, could be grouped by occupations the final results of compilation would probably show some deviations from the medians and middle 50 percents given in Table I. But the general tendencies therein indicated would no doubt be confirmed. There would be found more or less clearly defined levels of intelligence in the various occupations, corresponding roughly to the amount of intelligence necessary to succeed in them. There would be much overlapping and within each occupation a wide range of intelligence would be found. But in the occupational groups above unskilled labor one would expect to find critical scores<sup>7</sup> or points below which occupational success could not be expected.<sup>8</sup> In the professional group for example, one would expect to find the greatest number of occupational failures among the lowest 25 percent, i.e. among those who made scores ranging from 0 to 98.

#### APPLICATION TO GUIDANCE OF HIGH-SCHOOL PUPILS

How a knowledge of individual and occupational intelligence levels may be utilized in the vocational guidance of high-school pupils can be illustrated by the data presented in Table II. In this table 930 pupils in eight high schools are distributed according to vocational ambition and scores made on Army Scale Alpha and Examinations *a* and *b*. The different occupational choices have been divided into five groups: agriculture, mechanical and industrial, business and clerical, unclassified,<sup>9</sup> and professional. The professional group covers 50.5 percent of the choices, 470 cases; unclassified, 11.2 percent, 104 cases; business and clerical, 29.7 percent, 276 cases; mechanical and industrial, 3.6 percent, 34 cases; and agricultural, 5.0 percent, 46 cases.

The need for vocational guidance of high-school pupils is brought out very clearly by the way in which the choices are concentrated in the professional, semi-professional (i.e. unclassified), and business and clerical divisions of Table II. These include 31 different occupations, popularly known as "white collar jobs," and comprise 91.2 percent of the 930 choices. Agri-

<sup>7</sup> Thurstone, L. L. "Mental tests for college entrance," *Journal of Educational Psychology*, 10:129-41, March, 1919.

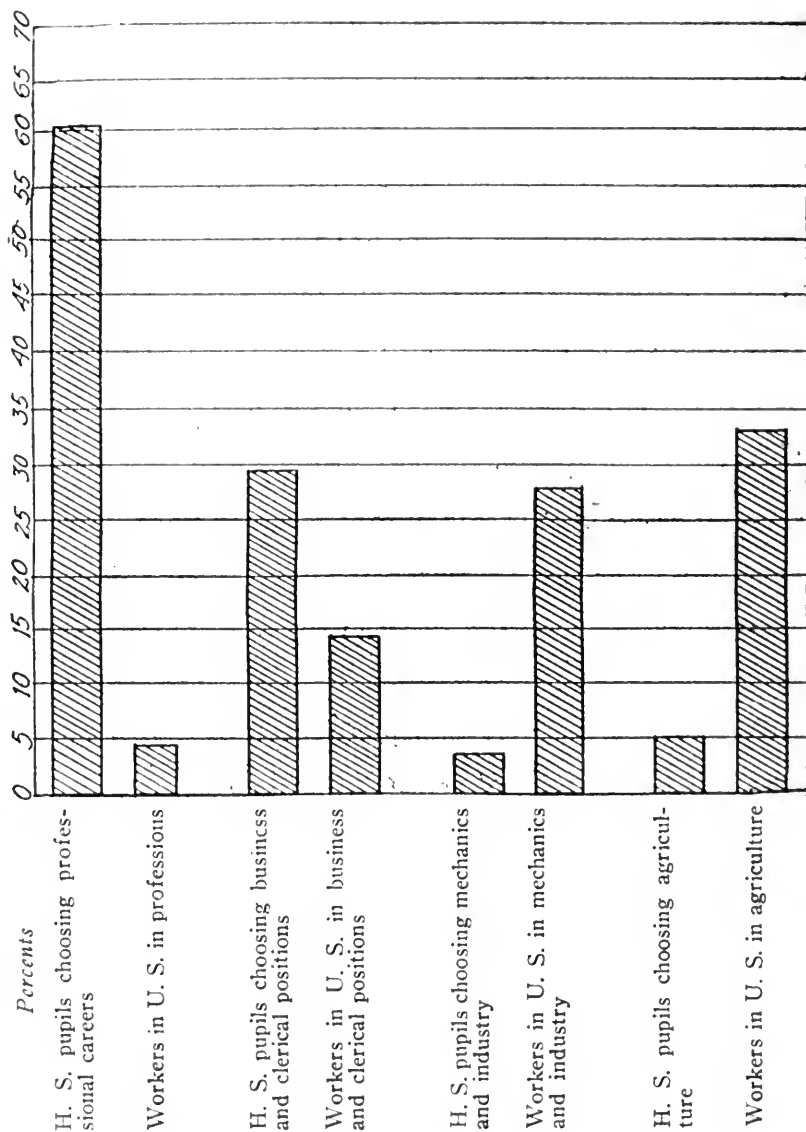
<sup>8</sup> Cowdery, K. M. "A statistical study of intelligence as a factor in vocational success," *Journal of Delinquency*, 4:227, November, 1919.

<sup>9</sup> Most of the occupations belonging to this group are called "professional" by the United States Census Bureau.

TABLE II. VOCATIONAL AMBITIONS OF 930 HIGH-SCHOOL PUPILS  
DISTRIBUTED ACCORDING TO INTELLIGENCE RATINGS  
ON ARMY SCALE ALPHA AND GROUP  
EXAMINATIONS *a* AND *b*

Letter rating . . . .	C—	C		C+		B		A	Total
Alpha.....	25-44	45-59	60-74	75-89	90-104	105-119	120-134	135-212	
<i>a</i> and <i>b</i> .....	25-49	50-67	68-84	85-99	100-119	120-137	138-154	155-237	
Choice of Occupation									
AGRICULTURE									
Agriculture.....		2	1	5	4	7	10	12	41
Floriculture.....					1				1
Forestry.....			1			1		2	4 46
MECHANICAL AND INDUSTRIAL									
Auto-mechanic.....					4				4
Dressmaker.....						2			2
Draughtsman.....			2	5		3	8	3	21
Electrician.....						1			1
Contractor.....					1				1
Milliner.....					1				1
Printer.....						1	1		2
Aviator.....					1		1		2 34
BUSINESS AND CLERICAL									
Banker.....				1				1	2
Bookkeeper.....		3	5	10	22	9	7	6	62
Business manager.....		1	2	6	5	3	1	5	23
Civil Service.....							1		1
Clerk (sales).....			1	1		1			3
Manufacturer.....					1	1			2
Real estate.....				1		1		1	3
Salesman (Tr).....					2	1	1		4
Stenographer.....	2	2	11	24	41	38	33	25	176 276
UNCLASSIFIED									
Actress.....				2	1	1			4
Army and Navy.....					3	3	2	6	14
Artistic career.....			2	2	10	5	6	3	28
Dancer.....							1		1
Dog Fancier.....					1				1
Home-maker.....			1		1	1	1	1	5
Nurse.....			4	7	10	11	8	6	46
Sea-captain.....					1				1
Social Service.....						1		1	2
Writer.....							1	1	2 104
PROFESSIONAL									
Architect.....						3			3
Bacteriologist.....							1	1	2
Chemist.....				1		3	3	7	14
Dentist.....		1		2	3	1	2	2	11
Druggist.....						2		3	5
Engineering.....			2	12	20	30	32	44	140
Journalism.....					2	3		5	10
Law.....					2	2	9	7	20
Librarian.....						1	2	2	5
Ministry.....							1		1
Physician.....				1	4	11	10	10	36
Teaching.....			8	23	44	68	47	33	223 470
Totals.....	2	9	40	103	185	215	189	187	930

FIGURE 2. COMPARISON OF OPPORTUNITIES WITH VOCATIONAL AMBITIONS





cultural, mechanical and industrial occupations include 11 different employments, and 8.8 percent of the choices. See Figure 2.

Vocational opportunities, as shown by the United States census reports,<sup>10</sup> are just about the reverse of the distribution of high-school pupils' occupational choices. Agriculture and the mechanical and industrial arts engage the energies of 61.1 percent of the gainful workers in the United States, and only 8.8 percent of the high-school pupils had ambitions looking toward these fields. Business and clerical employments enlist only 14.1 percent of the gainful workers of the country; and yet 29.7 percent of the high-school pupils plan to enter these fields of effort. In the United States census reports practically all of the occupations designated in Table II as unclassified, are included under the caption "professional service." In spite of this liberal interpretation of the term "professional" only 4.4 percent of the gainful workers are found to be engaged in professional service in this country. Nevertheless the professional and unclassified divisions of Table II include 574 choices, or 61.7 percent of the total number.

Although it is a fact that the high school represents a rather highly selected group of young people from whose ranks the clerical, business, and professional occupations are very largely recruited, it is apparent that by no means all of the 91.2 percent of high-school pupils will find their way into these occupational fields. Furthermore, for their own best good and the best good of the nation a great many of them should be directed toward the agricultural, mechanical, and industrial fields.

The question may be raised as to the use that a vocational counselor might make of such facts regarding the intelligence of high-school pupils as are shown in Table II. Assuming that occupational levels approximating those found in Table I have been established, the counselor could proceed on the theory that those falling within the lowest quartile of intelligence ratings, i.e. who make scores lower than the beginning score for the middle 50 percent of a given occupation, would probably have small chances of success as workers in that occupation.

<sup>10</sup> *Thirteenth census of the United States, 1910. Volume 4: population: occupation statistics.* Washington: Government Printing Office, 1914, p. 40.

Take the professional group. The intelligence score limits of the middle 50 percent as shown in Table I are from 98 to 184 (Alpha). There are fifty cases in the professional group, Table II, who made an intelligence score of less than 90 points on the Alpha scale. The counselor could safely consider the cases falling in this quartile of the professional group as doubtful. If teachers' estimates of intelligence and school marks confirmed the findings of the mental tests, he would be justified in making an effort to direct the thoughts of those boys and girls toward some other life career.

Specific occupations treated in the manner just outlined for the entire professional group would yield the following percents of doubtful cases: draughtsmen, 23.8 percent; bookkeepers, 21 percent; stenographers 22.1 percent; dentists, 18.1 percent; engineers, 24.3 percent; lawyers, 15 percent; doctors, 13.9 percent; and teachers, 33.6 percent.

If by making use of intelligence ratings of individual pupils in connection with the intelligence levels of the occupations which they are ambitious to enter the vocational counselor can give them more accurate advice as to the life career in which they are most apt to succeed he should by all means make use of such ratings. But it will probably be pointed out that intelligence ratings are not in themselves sufficiently reliable to justify their use in vocational guidance. To this objection it may be replied that the high-school counselor has at hand means of verifying the results of the mental tests. He can secure the estimates of teachers and others who know the pupils and he can secure the record of their success in school tasks. Agreement between teachers' estimates of intelligence and mental tests, or agreement between school marks and mental tests would greatly strengthen the presumption that the tests had succeeded in discovering the pupil's mental level.

#### DISCOVERY OF AGREEMENT BETWEEN MENTAL TESTS, SCHOOL MARKS, AND VOCATIONAL AMBITION

The cases of the high-school pupils, whose mental ratings and vocational ambitions are set forth in Table II, are redistributed in Table III in accordance with standing in school subjects, intelligence tests, and rank of vocational ambition. For the purposes of the three-way distribution, vocational ambitions

are ranked as follows: Rank I: higher professional and executive positions; Rank II: business, semi-professional, higher clerical positions; Rank III: general clerical, skilled labor etc.; Rank IV: semi-skilled labor; Rank V: unskilled labor.

Mental age equivalents for the Army Scale ratings were worked out by Dr. Samuel C. Kohs and the writer, and from these intelligence quotients (I. Q.'s) were computed. The mental level of a child is more nearly represented by the I. Q. than by the raw scores on an absolute point scale because the latter take no account of the chronological age.

Sex differences in rank of vocational ambition are indicated in column 10. There are 189 boys, or 45.1 percent of the total number of boys, but only 86 girls, or 16.8 percent of the girls, who chose vocations of the first rank. The vocational ambitions of 33.4 percent of the boys and 46.3 percent of the girls are represented by Rank II, and those of 21.5 percent of the boys and 36.9 percent of the girls by Rank III. There were none of the 930 who chose vocations of less than Rank III. The most numerous choices of the boys were for the engineering profession and of the girls for stenography and teaching.

How those whose ambitions come in the different ranks would probably measure up in mental ability to the demands of the occupations chosen can be estimated by reference to the nine possible combinations of I. Q. and school marks. Entries in column 1 show those who have I. Q.'s and school marks both below average. There are 51 classes in this group. Seven of them have chosen occupations of Rank I, and 18 of Rank II. Since school marks confirm indications of mental tests as to low mental level in these cases the success of these pupils in occupations of Ranks I or II would be open to question.

In column 8 there are 239 cases, 77 boys and 162 girls, having marks above average and I. Q.'s average. Here is an indication that the tests did not register the full ability of the pupils, or that they possess qualities of persistence and other attributes tending to supplement intelligence as factors in successful school work.

Columns 2 and 3 indicate that there are many pupils whose intelligence is average or above average but who do poor school work. Teachers are apt to rate such pupils low in intelligence.

TABLE III. DISTRIBUTION OF 930 HIGH-SCHOOL PUPILS ACCORDING TO INTELLIGENCE, SCHOOL MARKS, SEX, AND VOCATIONAL CHOICE

RANK OF VOCATIONAL AMBITION	MARKS BELOW AVERAGE						MARKS AVERAGE						MARKS ABOVE AVERAGE						10 TOTALS			
	1 I. Q. Below Average		2 I. Q. Average		3 I. Q. Above Average		4 I. Q. Below Average		5 I. Q. Average		6 I. Q. Above Average		7 I. Q. Below Average		8 I. Q. Average		9 I. Q. Above Average					
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	All	
	I.....	7	0	13	4	17	3	7	4	18	3	15	3	4	8	32	25	76	36	189	86	275
II.....	7	11	29	18	4	7	4	14	10	34	16	4	5	14	27	84	38	51	140	237	377	
III.....	6	20	14	26	5	0	3	11	15	30	13	4	7	19	18	53	9	25	90	188	278	
IV.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
V.....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total.....	20	31	56	48	26	10	14	29	43	67	44	11	16	41	77	162	123	112	419	511	930	

The mental tests give the counselor an insight into their true ability and enable him to employ methods of waking them up through the discovery of the right life-career motive.

The cases entered in columns 6 or 9 where the I. Q.'s are above average and school success is average or above average can be considered as satisfactory, so far as intelligence is concerned, for the occupations chosen. However, the counselor can be of great service to the pupils in these groups through his ability to give information as to the demand for workers, the opportunities for advancement, the qualifications as to health, temperament, training, etc., expected of those who enter the occupations selected for consideration.

There is no purpose here to suggest that a counselor should always advise those who have superior ability to enter high ranking occupations. If such a boy or girl would be more contented in an occupation ranking low on the rating scale there is no occasion to urge him to select another simply because it ranks higher in popular estimation. There is room for superior intelligence in every occupation, and it would be well for the country if young people of superior ability were encouraged to follow agricultural, mechanical, and industrial pursuits, in order that they might become leaders therein. The professions are overcrowded, but there is always room for young people with ideas and energy in the food producing and industrially creative occupations.

#### SUMMARY AND CONCLUSIONS

1. The use of psychological and trade tests in the selection of employees can be more easily shown to be effective, than can the use of such tests in vocational guidance. The employment manager can "play safe" by rejecting all but the most promising applicants, while the vocational counselor must needs endeavor to give sound advice to all comers.

2. Minute charting of abilities by means of psychological and trade tests is not practicable at the present time for the public school vocational counselor. There are far too many different occupations and the specific abilities of individual pupils are much too various to permit of accurate "pigeon-holing" according to manual, conceptual, and other types. Likewise a given combination of abilities might mean successful participation in any one of a wide range of occupations.

3. The discovery of the levels of intelligence of individuals and of occupational groups may prove to be of great assistance to the high-school counselor. The data on army mental tests, arranged in Table I, indicate that there are rather definitely marked occupational levels of intelligence. The norms already suggested would probably be confirmed by a compilation of all available data.

4. Application of the Army Intelligence Scale to 930 high-school pupils and the distribution of the cases according to intelligence rating and vocational ambitions is shown in Table II. Illustration is also given of the way in which this knowledge might be applied to the vocational guidance of the group tested.

5. Need of vocational guidance of high-school pupils is shown by the fact that the concentration of choices in the professional, business, and clerical occupations is out of all proportion to the opportunities in those lines as shown by the United States census. The demands for workers in agricultural, industrial, and mechanical pursuits should be emphasized by the counselor.

6. The need for supplementary information to verify the findings of the intelligence tests is shown in Table III. The 930 cases are distributed according to sex, school marks, vocational ambition, and intelligence. Where intelligence rating and school marks agree the presumption is that the intelligence level was approximated by the mental test. Where they do not agree it is a warning to make further inquiry into the matter.

7. The employment of psychological tests as an aid in vocational guidance is in the early experimental stage, but sufficient progress has been made to justify their use in a negative way, i.e., as a means of discovering to the counselor the kinds of occupations that a given high-school pupil would probably better avoid. They are useful also as a means of satisfying a counselor that a given pupil has the mental ability to engage in the occupation which he has chosen, providing other necessary factors conditioning success are present. In any case the counselor will do well to remember that he is dealing with probabilities and not with certainties. The mental tests, if conservatively employed, will increase the probability that the counselor will give really helpful advice.

## STANDARDIZING PROCEDURE IN A COMBINATION SYSTEM OF SUPERVISED STUDY, VARYING SCOPE OF WORK, AND WEIGHTED CREDIT

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The purpose of this paper is to set forth some of the methods employed in the Riverview Union High School in administering a combination plan which takes into account the variations of natural capacities and acquired interests, and at the same time accords credit toward graduation in proportion to individual achievement. The more general features of the plan are included in the accompanying chart taken from our *Teachers' and Students' Handbook*.

*Provisions of the general scheme summarized.*—The more outstanding provisions of the system may be briefly summarized as follows: (1) a specific statement in each subject concerning the scope and quality of work which a student of average ability should be able to accomplish when working up to his full capacity, i.e., the general requirements for the medium grade, B, which entitles the student to 1.0 unit of credit; (2) a careful enumeration in each subject of the characteristics of excellent work entitling the student to the A grade which carries with it 1.1 units credit; (3) a general statement in each subject relative to the many possibilities for extra scope of work which the student of superior ability, interest, initiative, and application may do along the lines of his special interests in satisfaction of the extra requirements for the AA grade which entitles him to 1.2 units credit; (4) special encouragement and direction for the student of extraordinary ability, interest, application, and achievement in doing an original piece of work relative to the subject for which he may be entitled to the AAA grade and 1.3 units credit; (5) provisions for diminished credit for inferior work; and (6) a full hour class period the first half of which is given to recitation and discussion and the last half to supervised study, enabling the teacher not only to give attention to the backward student in bringing him as nearly as

possible up to the medium standard but to direct and supervise the efforts of the more capable student along the lines of his special interests. It will be noted that the plan is not merely one for

### EXPLANATION OF MARKING AND CREDITING SYSTEM

(From the *Teachers' and Students' Handbook*)

Marks	Meaning of These Marks and Suggestions for Improvement	Crediting Value for Two Semester Subject	Approximate Number of Students in 100 Receiving This Mark
AAA	The AAA mark is reserved for the student or students of extraordinary ability, interest, initiative, and application. In addition to meeting the requirements for all lower marks, the AAA student must do a piece of original work in which he shows his ability to collect information from a variety of sources and to organize it into a well-written paper of reasonable length. Or, if the subject is non-academic in nature, the extra piece of original work may differ from that suggested above but, in any case, must be approved by the head of the department and by the principal of the high school. One or possibly two students in one hundred may reasonably be expected to do the work required for this mark.	1.3	1 or 2
AA	The AA mark is reserved for students of superior ability, interest, initiative, and application. In addition to meeting the requirements for all lower marks in a given subject, the AA student must cover an extra scope of subject matter which is to be indicated by the teacher. This extra scope should be rich in practical applications of the subject and should lead the student into a systematic use of supplementary materials such as reference books, encyclopedias, periodicals, government reports, etc. The nature of this extra scope should, so far as possible, be determined by the special interests of the student. Approximately, four students in one hundred should be successful in doing the work required for this mark.	1.2	4
A	The A mark is used to denote excellency in meeting the general requirements of a given subject. In a group of one hundred students there should be approximately twenty receiving the A mark. This twenty should be better than the seventy-five who receive lower marks; but hardly so good as the five best students in the hundred. The student receiving the A mark should show ability, interest, self-reliance, and application superior to the average student. His recitations should be excellent; his written work, accurate, neat and legible; his attendance regular; and his attitude toward school commendable. Nothing in the explanation of this mark should be considered to preclude assignments of desirable supplementary work.	1.1	20



MARKING AND CREDITING SYSTEM (*Continued*)

Marks	Meaning of These Marks and Suggestions for Improvement	Crediting Value for Two Semester Subject	Approximate Number of Students in 100 Receiving This Mark
B	The B mark is used to denote average ability and attainment in a given subject. In a group of one hundred students approximately fifty may be expected to receive this mark. This means that there are twenty-five students better and twenty-five poorer than this medium group of fifty. To receive the B mark a student must satisfy the general requirements of the subject with respect to the specific assignments, oral and written work, exercises, note books, translations, book reviews, tests, etc. All work must be reasonably prompt, neat and accurate. Good attention in class and proper use of time in school hours are taken into consideration in the assignment of this mark.	1.0	50
C	The C mark is used to indicate ability and attainment somewhat below the medium. In a group of one hundred students, approximately seventy-five will do a quality of work better, and five will do a quality of work poorer, than that represented by the mark. The quality of work entitling the students to this mark is just as far below the average as the quality of work for the A mark is above the average. For the marks C and B the scope of work is practically the same. The C student wishing to improve the quality of his work should follow the suggestions given under A and B.	.9	29
D	The D mark is used to represent the next lower step in the quality of work accomplished. It is as much inferior to C as C is inferior to B. In a group of one hundred students approximately four may be expected to do work of this grade and character. The D student who wishes to improve the quality of his work should follow the suggestions given under B and A.	.8	4
E	The E mark is used to indicate the poorest quality of work which may be accepted for credit toward graduation. It means that the student is either inferior in his ability or that he is not making the proper use of his time. The E students should try to improve the quality of their work by following the suggestions given under A and B.	.7	1
F	The F mark is used to indicate absolute failure.	.0	?

giving "extra credit for extra quality" of work accomplished. Quality is important but is not in itself sufficient. *Extra scope* and

*extraordinary kind* of work are to be encouraged if the student of superior ability is to receive justice.

*Standardizing teachers' procedure.*—One of the first steps in the administration of such a system is to make teachers familiar with the fundamental principles of variation. Although, on every hand, they are confronted with the general facts of variation, they need to have brought to their attention many specific cases of exact measurement and distribution. Illustrative cases for this purpose may easily be found in various books of statistical method, in the studies of Thorndike on individual differences, and in many articles of educational and psychological journals. Incidentally, the results obtained from various intelligence tests in our own high school still further corroborate the theory that capacities are distributed remarkably in accordance with the symmetrical curve.

The next move on the part of the administrator is to make clear the approximate distribution of marks in the adopted system if it is to be at all scientific. "We would laugh at a government," says Professor Max Meyer, "requiring each citizen to pay an income tax, but failing to state what percentage of the income is to be paid. We should likewise laugh at a school administration telling its teachers to report some A grades, some B grades, some C grades and so on. Each teacher, in reporting, would then unwittingly grade, not his pupils so much, but rather himself, his own notion of what ought to be done. That is, one would report that according to his conviction a teacher ought to report only, say, six percent A grades; another would express his conviction that a teacher ought to report, say, twelve percent A grades; a third would grade himself as believing in eighteen percent A grades; and so on to the most liberally grading teacher. But the school administration does not want its teachers thus to grade themselves. It wants them to grade their pupils, so that one may tell who is the best kind of scholar, who a less good scholar, and who a very poor scholar."

We have therefore taken the precaution not only to work out rather definitely the specific requirements for the different marks in our system but to indicate approximately the percent of students who ordinarily should be expected to receive these marks respectively. The B grade in our system is taken as the starting

point. (See definition in chart given above.) It is what the student of medium ability should earn when working up to his full capacity in school time and spending half an hour daily on each subject outside of classrooms. Since the student carries four subjects regularly, the teacher is cautioned against requiring more for the B standard than can reasonably be accomplished in half an hour of home study. (It is generally understood that on the average two hours of home study are necessary for satisfying our general requirements.) According to our definition of the B mark approximately fifty students in one hundred (in addition to those securing A, AA, and AAA) should earn it.

The B standards having been indicated, it is equally important to make clear the general requirements for the higher marks. The teacher is occasionally reminded that the A mark is used to denote *excellency* in meeting the general requirements of a given subject. (See statement concerning this mark in the chart at beginning of this article.) According to our definition of this mark approximately two students should earn it for every five who receive the B mark. This number, however, may vary; but any marked variation receives the attention of the principal. The AA mark, it will be noted, stands for *more than mere excellency* in meeting the general requirements of a subject. It is reserved for students of superior ability, interest, initiative, application, and achievement *who master an extra scope of subject matter or work* in a given study. The extra scope must be approved by both principal and teacher. This provision serves as a check to teachers who might otherwise be inclined to assign too many AA marks. It helps also to standardize the amount and kind of work required for the mark. According to our definition of the AA mark, approximately one student should earn it for every five who receive the A mark. Any wide variation from this ratio requires explanation. In the same way, the AAA mark is reserved for the student or students of *extraordinary ability, interest, application, initiative, and achievement*. As stated above the student must offer a piece of individual work extending through the semester (or year) in addition to satisfying the requirements for all lower marks. *This extra piece of work must be approved by teacher and principal*. This method of approval serves as a check on the system and assures the maintenance of high standards. According

to our definition of the AAA mark approximately one or two students in a hundred should be able to secure it. All conditions being normal, a too large percent of the higher marks indicates the desirability of raising the standards.

Another important factor in the standardization of our marking system is a monthly comparison of the distribution curves of the different departments with the general curve adopted for our system. Our teachers know, however, that there are *certain acceptable reasons for departure from the theoretical curve*: (1) an unusually large percent of students in a given class may have come from cultured homes; (2) an unusually large percent may have come from uncultured homes; (3) students may be of unusual maturity of mind; (4) the teacher may be extraordinarily skillful in effective instruction; (5) the class may be inadequately prepared for the subject; (6) the class may be exceptionally well prepared for the subject; (7) there may be an unusual percent of superior or of inferior students. On the other hand, teachers know equally well that there are *unacceptable reasons for departure from the theoretical curve of distribution*: (1) low marks because of attempting to cover too much ground; (2) high marks because of meager requirements; (3) low marks based on inadequate data; (4) high marks to give an impression of efficiency; (5) high marks to curry favor with students and influential parents; (6) high marks to avoid criticism of troublesome parents; (7) low marks because of one's own disgruntled disposition; (8) high marks because of the student's "effort" although it has been unproductive. With so many possibilities for variation from a normal curve of distribution, it is evident that a system of weighted credits needs careful supervision in order to insure the maintenance of high standards. .

When conspicuous variations from the adopted curve of distribution are in evidence it is, of course, the business of the administrator to ascertain if possible whether such variations are justifiable or remediable. In this connection we have found the results of intelligence testing of considerable value. It is needless to say that if a student has been found far below the average in mental capacity and is carrying away the highest marks in a particular class or classes, his case is one suitable for investigation. In like manner, if the student of superior ability as indicated by the

mental tests, is receiving marks considerably below the average, his case also needs attention. It is not always and necessarily found, however, that the marks of this bright student are too low. But the fact that there is a discrepancy between his capacities and his school standing may direct the attention of teachers and principal in such a way as to improve his work and eliminate the discrepancy. At the present stage of imperfection in mental testing, however, the principal should not depend exclusively upon the results of a single type of mental test. An average high score or an average low score for a number of the best-known mental tests is more dependable than a high score or a low score in any one of them.

As a mechanical means of administering the marking and crediting system, the accompanying form of report card has been devised and found useful.<sup>1</sup> The red lines are a constant reminder that B is a medium grade. Such a card makes it easy for the principal or supervisor quickly to get a general impression as to the comparative levels of grading of the different departments. With this card containing in graphical form the complete record of a student in all subjects for any month, semester, or full year, the principal can easily note any tendency of teachers to vary from the adopted standards. The key to the marking system included in every report card is also a checking device.

### MONTHLY REPORT

To Parent and Student:

The purpose of this report is to indicate the relative standing of the student, with respect to the poorest and the best. The student's grade is indicated by a check [✓] mark under the appropriate letter. Any check under B between a pair of red lines means good, average work and achievement; a check to the right of the red lines means poorer than the average for students in general; a check to the left of the red lines means better than the average. In order to do creditable work, every student will find it necessary to spend at least two hours a day in study outside the class rooms.

W. H. HUGHES, *Principal*

<sup>1</sup> The card actually used carries an abbreviation of the "Explanation of Marking and Crediting System" given on page 548. In order to draw attention to the "B" rating as the average mark, the lines inclosing this letter are printed in red. The card is in the form of a four-page folder. The second and third pages are shown here. The first and fourth pages are reserved for the name of the school and of the pupil and for the parent's signatures.—EDITOR.



The effectiveness of the foregoing methods may be seen in the following distribution of marks for the first semester of the school year 1919-1920. The entries are in percents.

Months	AAA	AA	A	B	C	D	E	F
September.....	0	0.5	10	49	27.5	9	2.9	1
October.....	0	4.0	16	48	26	5	1.0	0
November.....	0	3.9	20.1	44.3	24.7	5.6	0.6	0.4
December.....	0	4.1	19.7	43.5	23.0	8.3	0.8	0.4
January.....	0	2.0	17.8	42.2	26.0	9.5	1.8	0.5
Semester.....	0	3.9	19.5	43.3	24.8	6.6	1.8	0.0

With respect to supervised study, which is a part of our combination scheme, it is more difficult to standardize procedure because of the varied nature of the different subjects and the individual methods of teachers. Occasionally, however, we have found it profitable to call the attention of teachers to various possible sorts of classroom activities. Recently our teachers examined their own methods for an entire week indicating on a chart prepared for the purpose the approximate percent of class time devoted to each of the following activities: (1) assignment of work; (2) instruction in best methods of study, either general or specific; (3) recitation taking the form of quiz and consisting principally of questions and answers based on the general requirements in the regular text; (4) special reports by students on supplementary work related to the regular assignments, i.e., making the classroom a "clearing house" for information; (5) cooperative development lesson during which all students are simultaneously engaged under the leadership of the teacher in working up a new portion of the subject; (6) individual work by students either with supplementary books and materials or with laboratory and shop apparatus; (7) supervised study of general assignments and direction of extra-scope activities; (8) lecture by instructor; and (9) any other class activity employed by the teacher. The results of this study showed that our teachers are spending not more than one-fourth of the class hour in recitation, but at least three-fourths of the hour in the other forms of activity.

The attitude of our faculty and student body toward the system is most favorable. Almost without exception, our

teachers are enthusiastic over the plan and its possibilities. Many of us believe that the students of superior capacities are now accomplishing at least twice as much as formerly. We are equally confident that the work of every type of student has been improved. Never before have our teachers seen students so eager for supplementary work. Under the old system few of us believed that a freshman would, of his own accord, read over two thousand pages of supplementary material in a semester subject. Several freshmen under our present system have done this and at least one has read nearly three thousand pages. In every subject, students are "reaching out after more." These are some of the many reasons why practically all of our teachers are advocates of the present combination system of supervised study, varying scope of work, and crediting in proportion to individual achievement.



## MEASUREMENTS IN FAIRY TALE<sup>1</sup>

CYRUS D. MEAD  
*University of California*

Once upon a time there was in old England a very tall king who was about to make a fair princess the queen of his realm. Trousseau was of as much interest then as now, so the Very Tall King and the Fair Princess went shopping down through the narrow streets of London Town. By and by they came to the Shop of the Medium Sized Shop Keeper.

"I want," said the Very Tall King, "twenty yards of gold brocade." The Medium Sized Shop Keeper immediately drew forth a large roll and began to measure out the twenty yards of cloth in the accustomed manner.

"Hold on there," said the Very Tall King, "don't you know that it is from the point of the *King's* nose to the tip of his fingers that a yard is measured?"

"That is true, your Majesty," said the Medium Sized Shop Keeper, and handing the roll across the counter, he watched ruefully while the Very Tall King measured out twenty great, long yards of gold brocade.

By and by, as time went on, the Very Tall King died and his very short brother came to the throne. He, too, sought a fair princess for his queen, and one day they visited the same Shop of the Medium Sized Shopkeeper.

"I want," said the Very Short King, "ten yards of your whitest satin." The Medium Sized Shop Keeper threw the bolt down upon the counter, folded his arms, and waited.

"I want ten yards," again said the Very Short King.

"Very well, O King, measure it out," returned the Medium Sized Shop Keeper. "A yard, you know, is from the point of the King's nose to the tip of his fingers."

"You are right," replied the Very Short King, and he measured out ten little, short yards of satin.

Such was the yard in merry old England and even today some people have seen the department store clerk measure goods in

<sup>1</sup> Being the introduction to a demonstration of tests before the San Bernardino City Institute, December 16, 1919.

lengths of arm reach from the nose to the finger tips. So yards may come and yards may go, as clerks may be very short or very tall, but is a yard a yard?

A few days ago I stood before an inclosed glass case in the chemistry building of the University of California. My attention was called to a steel-and-brass rod. It was the shape of a miniature railroad "T" rail. A card read: "This is one meter—one ten-millionth of the distance from the earth's equator to the pole." And so meters may come and meters may go, but a meter is a meter regardless of kings and clerks. Yes, a yard is a yard today but it was centuries in the making.

The physical sciences have been made exact and are sciences chiefly in that there has been evolved, for each, definite units of measurement.

At one time, however, man expressed quantity in such terms as "heap much"; but "heap muches" varied. Yesterday the city across the bay voted upon a municipal tax rate of three dollars and eight cents. It may be a question whether or not the city's money will be wisely spent, but each citizen at least knows just how much he is to contribute. Regardless of municipal incompetency and rottenness, we are wont to call this "civilization." However that may be, it took man ten thousand years, or more, in economics to go from "heap much" to three dollars and eight cents.

A long time ago man expressed time by such terms as "many moons." Yesterday some of the boys landed at the Presidio with a flying time from New York of forty-three hours, thirty minutes and fifty seconds. It took man ten thousand years, or more, in chronology to be able to change "many moons" to hours, minutes, and seconds.

At one time number was expressed in such terms as "like the leaves of the trees." Yesterday the registrar said there were 9,457 "campus" students enrolled in the University of California, making it the largest university in the country. The science of definite numerical calculation has changed "the leaves of the trees" to units, tens, hundreds, and thousands, and definite comparisons become possible.

Now we as teachers have long since dealt in yards and meters, dollars and cents, hours and minutes, tens and hundreds; but we still make use of very changeable and indefinite terms. We claim

that a pupil's work is poor, fair, good, or excellent; but what is poor, fair, good, and excellent? Why, you say, poor is 60 percent, fair is 70, good is 80, and excellent is 90. But what is 60 percent? It is not only one thing to one and another thing to another, but it is also different for each of us at different times. Grading as tangible a product as a piece of writing without a handwriting scale and then with one will prove this. One geometry paper marked by a hundred and sixteen teachers of geometry was scored all the way from 28 to 92 percent, and this in a day when the physics laboratory of University Chicago "can rule a piece of polished glass one inch wide with fifty thousand straight and parallel lines equally spaced" and "can measure the five-millionth part of an inch—a distance amounting to one fiftieth of the smallest distance revealed by a theoretically perfect microscope."

For many centuries man has dealt in relatively exact terms in many lines of endeavor, and in so doing he has lifted himself from the stone age to a civilized state. It may have taken him ten thousand years. We in education cannot—probably never can—deal in terms anywhere nearly as exact as those of the physical sciences; but the time we have spent in developing more precise units has only been since 1910 when Thorndike evolved the first scale for handwriting! It is now my purpose to demonstrate the uses of some such scales and standardized tests. Will the class please come forward?

## PROVISIONS FOR INDIVIDUAL DIFFERENCES IN THE TEACHING OF READING<sup>1</sup>

W. W. THEISEN

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The results of standardized tests have everywhere revealed wide differences in reading ability. They have shown decided variations in such factors as rate of reading, knowledge of vocabulary, ability to gather thought from the printed page, and ability to read orally. Diagnostic analyses of results such as those made by Miss Zirbes<sup>2</sup> and others throw additional light on the nature of these differences. But in spite of all the facts brought to light, few attempts have been made in classroom teaching to provide adequately for individual differences in reading ability. The question is what can be done and what is being done by *successful* teachers.

The first question which this study seeks to answer is: What provisions for individual differences are employed by teachers generally considered successful in the teaching of reading? It is a matter of common observation that the average teacher does not satisfactorily make such provisions. For that reason we have tried to limit our study to strong teachers. The main purpose has been to find out what provisions are in actual use by such teachers and which provisions can be recommended to teachers in general.

Our second question is: What suggestions for the less experienced teacher can be gained from the study? E.g., What values have the various provisions which we have found to be in use? Are the most valuable always among those most favored? Which ones are suitable for the different grades?

Light was also sought on these additional questions: Are even these teachers of acknowledged success widely conscious of the problem? How far do they avail themselves of the means at hand?

<sup>1</sup> An address delivered before the National Association of Directors of Educational Research at Cleveland, Ohio, February 26, 1920.

<sup>2</sup> Zirbes, Laura. "Diagnostic measurement as a basis for procedure," *Elementary School Journal*, 18:505-22, March, 1918.

## METHOD OF THE STUDY

A letter was sent to a number of supervisors and superintendents of schools where there was reason to expect good instruction in reading with the request that a few of the best teachers be asked to reply. Copies of a circular stating the nature of the inquiry were inclosed for the benefit of the teachers. The circular merely asked that the person write us in detail telling what means she was using in the teaching of reading to provide for individual differences. She was requested also to offer suggestions as to methods that she thought could be used. Of the 123 replies received 118 were used in the study. A few appeared to have misinterpreted our request. The 118 were distributed on a percentage basis as indicated in Table I.

The results of this inquiry will be referred to throughout as the *original study*. After the first group of returns had been tabulated, a suggestive list containing the provisions listed in Table I, without figures, was sent to those who had replied and to a number of other strong teachers. On this list each person was asked to check the provisions which he or she used in teaching. The object was to provide a check on the results obtained in the original study.

## THE PROVISIONS FOUND

For the present we shall confine the treatment to the original inquiry. The provisions found may be divided for convenience into two general divisions. The first we may designate as *extra-classroom* and the second as *intra-classroom*. Those belonging to the first have to do more with the steps preliminary to actual classroom procedure. In the *extra-classroom* division are two groups of provisions that offer us some assistance in solving the problem of individual needs. They apply not only to reading but to all subjects. (1) Attention to physical needs. (2) A flexible system of promotions. The *intra-classroom* provisions may be classed under seven headings in Table I: (A) Testing of individual abilities; (B) Grouping of pupils within the classroom; (C) Gradation of materials; (D) Variation in amount of reading practice; (E) Personal attention given to individuals; (F) Adaptation to and development of individual interests; (G) Specific forms and phases of instruction—or what may be called “methods.”

TABLE 1. PROVISIONS FOR INDIVIDUAL DIFFERENCES IN THE TEACHING OF READING REPORTED ORIGINAL STUDY

PROVISIONS	PERCENT REPORTING THE USE OF EACH PROVISION				
	Pri- mary	Inter- mediate	Gram- mar	Super- visors	All
(A) <i>Testing of Individual Abilities</i>					
1. Tests of rate and comprehension . . . . .	6	32	29	46	24
2. Intelligence tests . . . . .	6	0	0	0	3
(B) <i>Grouping of pupils</i>					
1. Pupils arranged in small groups by ability . . . . .	58	39	14	54	45
2. Pupils in small groups <i>not</i> by ability . . . . .	3	7	14	8	6
(C) <i>Gradation of materials read</i>					
1. Graded to fit individual ability . . . . .	42	32	7	46	34
2. Selected by pupil's own choosing . . . . .	10	20	21	23	16
3. Portions in oral reading or dramatizing assigned according to individual ability . . . . .	8	7	14	15	9
(D) <i>Variation in amount of reading practice</i>					
1. Voluntary reading in free periods . . . . .	40	22	21	23	29
2. Home reading . . . . .	27	44	29	23	32
3. Additional periods . . . . .	15	5	7	23	11
4. Poorer called on more frequently in oral recitation . . . . .	0	0	7	8	3
5. Rapid cover more in silent reading . . . . .	4	7	7	0	5
(E) <i>Personal attention to individuals</i>					
1. Special help for specific defects . . . . .	46	44	43	46	44
2. Use of better pupils to help poorer . . . . .	38	20	14	23	26
3. Home help . . . . .	4	2	21	0	5
(F) <i>Adaptation to and development of individual interests</i>					
1. Materials chosen for individual interests . . . . .	8	22	29	31	18
2. Individual choice of parts . . . . .	4	2	7	8	4
3. Best read for inspiration to poorer . . . . .	2	5	0	0	3
(G) <i>Specific forms and phases of instruction</i>					
1. Centering attention upon thought					
a. Silent reading . . . . .	65	83	71	77	65
b. Use of thought questions . . . . .	27	51	43	15	36
c. Illustrate material read by drawing . . . . .	6	7	0	0	5
d. Thought drills . . . . .	3	27	21	8	14
2. Problem assignment . . . . .	4	2	0	8	3
3. Motivation . . . . .	54	54	36	23	48
4. Dramatization for certain pupils not included under C-3 . . . . .	3	10	7	15	7
5. Word and phonic drills . . . . .	35	39	29	54	41
6. Phrase drills . . . . .	19	29	7	31	23
7. Speed drills . . . . .	0	17	29	23	14

NOTE: Percentages are computed on the basis of returns from 118 teachers and supervisors distributed as follows: Primary grades I and II, 48; intermediate, grades III, IV, and V, 41; grammar, grades VI, VII, VIII, 14; supervisors, 13; ungraded, V; not specified, 1. Geographically they represent 13 states.

We shall dwell only very briefly on the two groups under the *extra-classroom* division, as these are usually outside of the control of the classroom teacher. As regards health, it may be said that cases of individual differences often call for physical attention. Every school system should provide for expert diagnosis and treatment of physical defects. Many teachers believe that pupils would receive instruction more nearly suited to their needs under a genuinely flexible system of promotion. This would undoubtedly aid in the solution of our problem. But these provisions are usually administrative matters, and as such are outside of the scope of our study.

Let us now consider the measures which we have called *intra-classroom* or teaching. The various provisions under the seven group headings are given in Table I. The percent of frequency for the different classes of teachers and for all combined is shown. *Testing of individual abilities* is placed first because it is logically the first step. Adequate provision for individual differences cannot be made without testing and analytical study of the abilities of pupils. Diagnosis, in education as in medicine, must precede prescription. It is significant that only one-fourth of the teachers considered the application of educational tests of sufficient importance to be mentioned. The use of intelligence tests was indicated by but 3 percent of them. We may be charitable in the case of intelligence tests as few teachers are either trained to give them or able to call upon anyone else to do so. But we can no longer excuse any but possibly first-grade teachers for failure to apply educational tests and to utilize the findings as a basis for intelligent procedure.

We have as one proposal for meeting individual differences *the grouping of pupils of a grade into several small groups*. Grouping together pupils of approximately equal abilities was among the three provisions most frequently mentioned. Another form of grouping is sometimes used, although it is of somewhat doubtful merit as a specific provision for individual differences. It is used in oral reading recitations, and consists in dividing the class into smaller units without attempting to place pupils of equal abilities together. The underlying theory apparently is that individual needs are met in part if the individual's opportunity for reading is increased.

The particular merit of grouping on the basis of ability is that it permits *gradation of materials*. If pupils having similar weaknesses and instructional needs are grouped, the treatment of their special deficiencies can be carried on apart from the remainder of the class. An application of this method may be seen in the study by Miss Zirbes to which reference has already been made.

*Gradation of materials* furnishes an important means of providing for differences in ability. The aim here is to allow each pupil to read material suited to his development. Thirty-four percent of the teachers reported that they attempt to choose material fitted to individual abilities. Nine percent say that they attempt to base the assignment of portions of the lesson in oral reading or in dramatizing upon individual abilities. Sixteen percent allow pupils to select materials for themselves. Naturally a child rarely chooses material so difficult that he does not enjoy it.

Individual differences in reading ability can be cared for in part also through *variations in the amount of reading practice*. Variations in practice can be afforded through voluntary reading in free periods, home reading, group assignments, and individual assignments. Some provide additional class periods. The brighter may read with an advanced section. The weaker may read with a lower section or remain after school for an extra period. The advisability of the latter may be questioned. Calling upon the poorer pupils more frequently in the oral recitation, as employed by a few of our correspondents, is indefensible from the standpoint of the brighter pupils.

*Personal attention* is a common method of meeting the requirements of individuals. By this means, it is hoped to give each child or group such attention as is needed to remove specific weaknesses. Mass drill is apt to be uneconomical to say the least. Pupils can be assisted with their difficulties through individual or group attention on the part of the teacher (while others engage in silent reading), through assistance from stronger pupils, and through home help. Of the three types listed in the table special help from the teacher is most often given. The use of the better pupils to aid the poorer, a practice that is open to question, is mentioned all too frequently. Too many teachers seem obsessed with the notion that abilities should be "levelled off" as one teacher expressed it, rather than permitted to make a natural



development. Home help does not appear to be popular with teachers.

In the judgment of a number of our correspondents, individual reading needs can be satisfied further by *developing and utilizing the child's own interests* and choosing his reading material accordingly. The table shows, however, that only a small percent suggested provisions that could be classed under interest. Only 18 percent, ostensibly, are making efforts to have material chosen in accordance with individual interests. The showing of the primary teachers is lamentable. The teacher must seek to discover a child's impelling interests as a basis for the choice of materials for him. In the words of one teacher, "Every child shows more interest in some one thing than another. The greatest difficulty is experienced in trying to find where this natural interest lies. This is the key which must be found in order to help him interpret new experiences."

To meet individual interests adequately every school must provide an abundance of material. This is where many fail. Good material for primary grades remains largely to be written. It is almost impossible to find any considerable number of books based upon worth-while interests of children and suitable for first or second grades. *We impose upon the good nature and submissiveness of children by putting them through the dry, artificial, and disjointed material of method readers, or fool them into liking stories founded upon superficial interests and built upon unreal situations.*

The final group of provisions of Table I entitled *specific forms and phases of instruction* includes provisions that pertain more to the teaching process. Our aim should be to furnish such teaching as will most nearly fit individual needs and permit maximum individual development. This can be accomplished, to an extent, by choosing methods that permit independent progress. This is doubtless the thought underlying "silent reading," which was suggested more often than any other single provision. The problem method is especially suitable for permitting independent progress. The unfamiliarity of teachers with this method and with its possibilities is emphasized by the fact that only 3 percent of the teachers mentioned it.

Our program for individual development can be carried out further by the choice of methods that center attention primarily

upon thought and the development of right habits of thinking. The child who develops such habits becomes more nearly independent. These considerations underlie such provisions as are listed under the caption of "centering attention upon thought."

We can do something for children by supplying incentives that lead to independent efforts. Motivation in some form is quite prominent with each class of teachers represented in the table. Some of the suggestions classed under this heading include the preparation of a story to be read to the class, test charts upon which the individual can note his own progress, dramatizing (especially in lower grades), and contests of various sorts.

Instruction for the pupils who need it in particular phases of reading, such as word analysis, word differentiation, speed, phrasing, organizing of the thought, and the like tends toward a proper individual development. Some of the provisions of this type could possibly have been classified under the caption of "personal attention." Word and phonic drills for individuals rank relatively high in the whole list of provisions.

A better idea of the frequency with which provisions in each of the seven groups were mentioned by each class of teachers may be had from the summary in Table II.

TABLE II. PERCENT OF TEACHERS WHO STATE THAT THEY MAKE SOME PROVISION CLASSIFIED UNDER THE GROUP HEADINGS INDICATED. ORIGINAL STUDY

Provision for:	Primary	Inter- mediate	Grammar	Super- visors	All
(A) Testing.....	10	32	29	46	25
(B) Grouping.....	60	44	21	62	49
(C) Gradation of material....	44	54	36	54	47
(D) Practice.....	46	54	43	54	49
(E) Special help.....	60	61	57	62	59
(F) Interest.....	15	27	36	31	24
(G) Method.....	90	98	93	92	93

The greatest possible, and in most cases the most desirable, figure would be 100 percent. More than 90 percent suggested some provision which can be classed under *method* but only half, roughly speaking, suggest any form of provision that may be

classed under the headings of *grouping*, *gradation of material*, *practice*, or *special help*. The last is next to *method* in frequency. Only one-fourth list anything under the heading of *testing* or *interest*. The figures of the table, we fully believe, may be taken as indicative of what these teachers actually do. No large percent of them appear to have anything like an adequate comprehension of the problem. If these figures represent the actual facts for teachers of more or less acknowledged success, what must be true of *average* teachers!

The small percent of those who suggest *testing* is probably due in part to the fact that testing is rather new. This is especially evident in the case of the primary teachers. We are very much surprised, however, that fewer than a third of the intermediate and upper grade teachers thought of testing as a step toward adequate provision for individual differences. It is positively known that some in whose rooms reading tests had been given within the year did not mention testing. Exposure does not necessarily affect practice. *The problem of research workers is much more than inducing people to administer tests. They must be taught how to apply the findings.*

*Grouping* is much more popular with primary teachers and supervisors than with other classes of teachers. *Gradation* of materials drops off in the grammar grades where it should be strong.

The element of interest in primary grades should be a cause for concern. Only 15 percent apparently make serious efforts to fathom the interests of the individual child. It is entirely possible that this reflects the unusual deference paid to *mechanical methods* which appear to be blotting out all conceptions of the importance of interest. In the grammar grades, where teachers are forced by circumstances to study interests, the percent opposite *interest* is more than twice what it is in the primary grades.

By way of comparison it will be interesting to note what happened when these teachers were furnished with a list of all of the significant provisions already found and were asked to check the ones they were using. Table III gives facts similar to those of Table II, but for the suggested list. It is evident from this that teachers either failed on the original inquiry to record all that they were doing, or that they were ready to acquiesce very largely

TABLE III. PERCENT OF TEACHERS WHO STATE THAT THEY  
MAKE SOME PROVISIONS UNDER THE GROUP HEADINGS  
INDICATED. SUGGESTED LIST

Provisions for:	Primary	Inter- mediate	Grammar	Super- visors	All
(A) Testing.....	35	81	100	91	74
(B) Grouping.....	94	76	100	100	89
(C) Gradation of material....	94	100	100	100	98
(D) Practice.....	100	100	100	100	100
(E) Special help.....	100	95	82	100	95
(F) Interest.....	100	86	100	100	93
(G) Method.....	100	100	100	100	100

in the provisions suggested to them. It is our candid opinion that Table II represents more nearly what is actual practice. It indicates what these teachers have thought about sufficiently to put into practice. Table III represents more nearly an ideal.

A further check on the breadth of teachers' conceptions of the problem may be had by noting the number of groups of provisions to which they contributed. Table IV indicates for both the original study and the suggested list the percents of each class of teachers who suggested provisions: (a) under four or more of the seven groups used in preceding tables; and (b) under three or fewer of them.

TABLE IV. PERCENT OF TEACHERS WHO CONTRIBUTED TO  
VARIOUS NUMBERS OF THE SEVEN GROUPS LISTED  
IN PRECEDING TABLES

TYPE OF TEACHER	NUMBER OF GROUPS OF PROVISIONS			
	Original Study		Suggested List	
	3 or less	4 to 7	3 or less	4 to 7
Primary.....	54	46	0	100
Intermediate.....	42	59	5	95
Grammar.....	64	36	0	100
Supervisors.....	23	77	2	98
All.....	48	52	2	98

In the original study nearly half failed to qualify for entry in more than three groups. The grammar-grade teachers appear to have the most limited viewpoint, for nearly two-thirds of them

failed to offer anything which could be included in four or more groups. The supervisors and superintendents give evidence of their broader conception of the problem. The summary for the suggested list is only what we should expect after seeing Table III.

When the teachers checked the suggested list, they gave us a cue to the measures which, in general, are most frequently favored. Table V indicates, in the order of frequency, the percent of teachers who checked each of the 28 provisions. Those most often checked by teachers of different types are indicated by a plus sign and those most seldom by a minus sign. There were but 61 returns, however, and for that reason the results must be discounted. Moreover, the wording of certain of the provisions may have caused some misinterpretations. The fact that we were dealing with provisions for individuals and not with class provisions may not always have been kept clearly in mind.

As any keen student will detect, the order falls short of being one of merit. We can judge from it which of the measures are relatively popular with each class of teachers and which ones are either not favored or are not sufficiently familiar to them. The five provisions most favored by all teachers are *silent reading*, *use of thought questions*, *voluntary reading in free periods*, *home reading*, and *special help for specific defects*. Strangely enough, voluntary reading appeared to occupy a much lower position among upper-grade teachers. It is possible that this is due in a measure to the formal programs of these grades, which permit little freedom or initiative. Among primary teachers *voluntary reading* receives first place. *Silent reading*, *special help*, and *grouping by ability* come next. Intermediate-grade teachers place *silent reading* and *use of thought questions* first. *Voluntary reading* is third. Upper-grade teachers place *educational testing* and *home reading* first. *Silent reading*, *use of thought questions*, *thought drills*, and *having the best read for inspiration to the poorer* are other provisions that rank high with these teachers. Every supervisor and superintendent checked *silent reading*, *thought questions*, *special help*, and *grouping by ability*. As might have been surmised, they checked a larger number of items than any other group.

The items checked by fewer than one-half of the 61 teachers will be seen from the table. It is to be regretted that so few

TABLE V. RANK OF THE VARIOUS PROVISIONS FOR INDIVIDUAL DIFFERENCES—BY PERCENT OF FREQUENCY. SUGGESTED LIST

Provisions	All	Pri- mary	Inter- mediate	Gram- mar	Super- visors
*Silent reading (G).....	97	94(+)	100(+)	91(+)	100(+)
Use of thought questions (G).....	93	82	100(+)	91(+)	100(+)
*Voluntary reading in free periods (D)...	87	100(+)	95(+)	45	91
*Home reading (D).....	87	71	90(+)	100(+)	91
*Special help for specific defects (E)....	87	94(+)	81	73	100(+)
Oral reading or dramatizing assigned according to individual ability (C) ..	85	77	90(+)	82	91
Best read for inspiration to poorer (F)...	84	88	76	91(+)	91
*Pupils in small groups by ability (B)...	82	94(+)	62	82	100(+)
Poorer called on more frequently in oral recitation (D).....	79	71	81	73	91
Rapid cover in silent reading (D)....	74	77	71	73	82
*Material graded to individual ability (C)	74	77	62	82	82
*Thought drills (G).....	72	59	71	91(+)	82
*Tests of rate and comprehension (A)...	70	29(-)	76	100(+)	91
*Materials chosen according to individual interests (F).....	69	65	67	73	82
Material of pupils' own choosing (C)...	69	65	71	45	91
Phrase drills (G).....	69	82	71	36(-)	73
Word and phonic drills (G).....	69	88	62	27(-)	91
Illustrate material read by drawing (G)	66	77	57	45	82
Use of better pupils to help poorer (E)...	62	59	71	45	73
Speed drills (G).....	61	65	67	45	64(-)
Motivation (G).....	61	65	57	45	82
Individual choice of parts (F).....	61	59	52	73	73
*Problem assignment (G).....	48	29(-)	48(-)	64	64(-)
Home help (E).....	48	47	43(-)	27(-)	82
*Intelligence tests (A).....	48	18(-)	52	73	55(-)
Pupils arranged in small groups <i>not</i> by ability (B).....	46	29(-)	43(-)	36(-)	91
Additional periods (D).....	34	47	14(-)	9(-)	73
Dramatization for certain pupils (G)...	33	29(-)	29(-)	45	36(-)

NOTE: The provisions starred represent those which we believe to be among those most worthy of consideration. Capital letters following each provision indicate the group under which it was classified—(A) testing; (B) grouping of pupils; (C) graduation of materials; (D) amount of reading practice; (E) attention given to individuals; (F) development of individual interests; (G) instruction. Figures followed by plus signs indicate provisions most frequently favored by each class of teachers. Similarly, minus signs indicate those least favored.

The figures above are to be taken merely as suggestive. They are based upon only 61 returns as follows: primary 17; intermediate 21; grammar 11; supervisor 11; mixed 1.

teachers are familiar enough with the *problem method* to put it into reading practice. This method could be used more successfully than most of those contained in our list as a means of providing for individual differences. The application of *intelligence tests* as we might expect occupies a low place because teachers have not been trained to use them.

The provisions which the writer deems among those possessing on the whole the most merit have been starred in the table. Several others are good. Few should be discarded entirely. These conclusions are based not only upon the study but upon observations of the classroom efforts of a number of teachers who were consciously attempting to meet the problem.

Our main purpose in this study, however, has not been to evaluate the provisions in use but to find, if possible, those that are being employed by successful teachers together with the suggestions to be gained for the less-experienced teacher. We believe the measures for meeting individual differences listed in Tables I and V represent a variety that will be suggestive. It is not a complete list. The validity of several of the proposed measures needs to be tested experimentally. Our best hope is that the study may serve as a stimulus to further investigation in this field. We trust that it will cause a few teachers at least to form a broader conception of the problem of meeting individual differences in reading ability.

# SCALE OF ATTAINMENT NO. I.— AN EXAMINATION OF ACHIEVEMENT IN THE SECOND GRADE<sup>1</sup>

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## I. THE NEED FOR SUCH AN EXAMINATION

Systematic surveys of schools or school systems, in which standardized tests in the various subjects are employed, now constitute a common method of appraising the "efficiency" of a school, or system, in its work of training children. Relatively little has thus far been done, however, by way of putting together in convenient form groups of tests that may be thus used. In planning for a survey a superintendent ordinarily orders a variety of tests from a variety of sources—and gives them, often, in varying order. The directions from test to test are not related, sizes of blanks often differ, and, in order to gather together the results from such a survey, several separate blanks must be handled for each child.

The purpose in developing the scale to be described in the present paper was, first of all, to remedy these practical difficulties. School surveys have already proved their value. The development of instruments which would make such surveys less laborious and more practicable, and which would make the data obtained more readily interpretable with reference to every-day school problems, would surely seem well worth while. The writer has had certain further possible uses in mind in the development of the scale—uses which will be discussed shortly. But the examination is intended primarily as an instrument for use in the second grade in school surveys.

Effort was concentrated on the second grade because there is a lack of satisfactory tests for this grade, because the very concrete nature of the subject matter in this grade made test formulation relatively easy, and because the grade was considered especially important as that in which the first serious attack is made upon the "tool subjects." The grade also seemed especially appro-

<sup>1</sup> Studies from the Psychological Laboratory of Indiana University.



priate for a first experimentation as to the value of the general concepts involved in the examination. In the second, rather more readily than in any other grade, it should be possible to express in a single examination the fundamental features of the basic subjects taught.<sup>2</sup>

## II. THE SCALE

The scale consists of four tests, one on each page of a four-page folder. On the first page are the spaces for name, age, grade, and sex, and then 24 lines on which are to be written the 24 words of the spelling test. On the second page is a test designed to measure reading vocabulary. It consists of 29 lines, 5 for a preliminary exercise and 24 for the test proper. Each line consists of four nonsense combinations and one real word. The children are told to "find the real word, and draw a line around it—so I'll know where it is." The first five lines of the test are reproduced below:

### II. WORD RECOGNITION

1. pl bn is ct lu
2. ot the bis ln tsp
3. I e t m b
4. ml sb tu ro go
5. mp mbs ris sec clo

The third page presents the arithmetic test, which consists of forty-six addition and thirty subtraction combinations. The fourth page gives the "silent reading" test, which is made up of 24 sentences (plus 5 preliminary examples), each one having an extra or confusion word in it; the children are to find this unnecessary word, and cross it out. The first five lines of the test run as follows:

### IV. UNDERSTANDING OF SENTENCES

1. I ball see a boy.
2. See dog my pretty book.
3. I like to gun play ball.
4. I cat can see my doll.
5. The baby is my book little sister.

<sup>2</sup> It should be mentioned, however, that effort in this direction has not been limited to the second grade; the Laboratory now has in process of standardization an examination in American history, arithmetic, geography and English for use in junior high school, and plans further work along this line later.

Directions for the spelling and arithmetic tests are obvious enough and need no comment. The directions for the tests of reading vocabulary and understanding of sentences employ the question-and-answer method in developing the problem of the test, using the first five lines as examples. The directions for the reading vocabulary test are as follows:

Look at the first line! Who can see a real word in that line? What is the word? . . . Yes, "is." What part of the line is it in? . . . Yes, right in the middle. I want you to draw a line around the word "is" because it is the only *real* word in the line. The other groups of letters don't make words. Draw a line around "is."

Look at the next line. What is the real word? . . . Yes, "the." Draw a line around "the" because it is the only real word in the line.

Look at the next line. What is the real word? . . . Yes, "I." Draw a line around "I."

Look at the next line. What is the real word? . . . Yes, "go." Where is the word "go." Yes, on the very end of the line. Draw a line around "go."

Look at the next line. What is the real word? . . . Yes, "see." Draw a line around "see."

Now, everyone attention! I want you to read over the rest of the lines on the page in the same way. In each line there is *just one* real word. You find the real word in each line, and then draw a line around it. (Time, 3 minutes.)

In scoring, each item in each test is simply counted as right or wrong, and the total number of correct items on each test is considered the score on that test. The highest possible score is thus 46 points in addition, 30 in subtraction, and 24 on the other three tests. In making up a total score, or rating in total achievement in the fundamental subjects of the second grade, the scores on the four tests are simply added (the rights in addition and subtraction being added together and divided by two to prevent over-weighting of arithmetic).<sup>3</sup>

<sup>3</sup> This rather crude method of obtaining a total on the scale was adopted only after considerable experimentation with more elaborate forms of handling. It has the prime merit of simplicity, and small likelihood of error in the doing. Transmutation of standing on each test into units of amount on a normal distribution curve was first tried. Values above the 95-percentile on each test were assigned a value of 7; values between the 95- and 85-percentiles a value of 6, and so on; these values were then added to give the total score. But the values thus obtained were found to correlate very highly (0.96) with values obtained by the crude method described above; the transmuting of values seemed, under the circumstances, not worth the labor.

Certain features of the form of the test remain briefly to be pointed out. The folder is of a convenient size—9 by 6 inches. The first page shows only the blank lines for the spelling test; and there is thus no opportunity for study of any test as the blank lies on the pupil's desk before the examination begins. Not over ten minutes are required for giving the spelling. Three minutes are allowed for each of the two reading tests, one and a half minutes for addition, and two minutes for subtraction. In fact, not over 25 minutes are needed for the entire examination—surely not an excessively long period even for the second grade. The examination is not wearying for the children to take, writing being required on the first test only. And scoring is easy and objective; for with a little practice an entire examination can be scored in one minute. In short, the effort throughout has been to make the scale as convenient and practical for survey work as possible.

### III. THE DEVELOPMENT OF THE SCALE

Work upon the scale began with a careful investigation of courses of study usual in the second grade. It was the aim of the writer to include in the examination only those subjects which are important in conditioning a child's school progress (the "promotion" subjects). Measurement of work in drawing or music was, therefore, not attempted. Writing was also omitted, because, though important, it was not a subject, according to the universal testimony of second-grade teachers, which could be considered critical—not a subject which actually did have any influence upon school progress. Reading was, according to the teachers, the most important subject in the second grade. This fact was recognized by devoting two tests to the subject. The other two fundamental subjects were spelling and arithmetic.<sup>4</sup>

For the spelling test, words were taken from the Ayres Spelling Scale, a list being made up after much trial which gave a fair measure covering the range of second-grade ability in the subject. The arithmetic tests are essentially similar to tests A and B of the Cleveland Survey series.<sup>5</sup> The arithmetic tests are distinguished

<sup>4</sup> It should be mentioned, in this connection, that the method of combining scores on the separate tests above referred to weights the subjects roughly in proportion to the teacher's estimate of their importance, the weighting running roughly 2, 1.5, 1 for reading, arithmetic, and spelling in order.

<sup>5</sup> Judd, Charles H., *Measuring the work of the public schools*.

from the other three tests (spelling, word recognition, and understanding of sentences) in that they are speed tests. The timing is carefully adapted to second-grade performance.

The two reading tests are, as far as the writer knows, original. The word-recognition test is the result of a long series of efforts at the development of a visual vocabulary test for use with young children. The problem was essentially a matter of directions. The test must be such that the directions could be so simple, natural, even colloquial, that a child would have no difficulty whatever in expressing, through the test, the extent of his reading vocabulary. The form described above was finally hit upon as filling, to a fair degree, these requirements. There were only ten zero scores out of 320 cases (0.3 percent); that is, failures to understand directions were very few. In fact, this game of finding the real word is not an uncommon practice in phonetics, and is readily entered into by the children.<sup>6</sup> The children's response is simple and easy; they merely draw a line around the real word. Further, scoring is the extreme of simplicity. Any indication of the correct word—a line around it, or a mark through it or any other reaction which points unequivocally to the correct response—is considered satisfactory. There is only one rule—that not more than one word should be marked in each line. The test of understanding of sentences, it may be said shortly, has similar advantages in giving, taking, and scoring; and it also has an extended history.

The preliminary experimentation was done in the schools of Bloomington, Indiana. A total of fifty-five words from the Ayres' list and fifty items each for the two reading tests were given to the Bloomington second-grade children. The difficulty of each item was expressed as distance on a P. E. scale; and items

<sup>6</sup> Indeed, another form of the test, with easier words, has been used successfully by the writer in the IB grade. It should also be mentioned that a distinctly useful test for the third grade might be formed by changing this test so that there would be four real words and one nonsense syllable in each line; the children would then be told to "cross out the letters that don't make a word." Such a form was experimented with but proved too hard for the second grade.

It should be mentioned that the words used in this Word Recognition Test were taken directly from the Haggerty Visual Vocabulary Test. (Haggerty, M. E. Scales of Reading Vocabulary for Primary Children. *El. Sch. Jour.* 17: 2, Oct. 1917.) The individual examination—to be referred to shortly—was therefore an examination with Haggerty's test.

giving fairly equal steps on the scale were incorporated into the final form. The arithmetic test differs from the preliminary form only in being somewhat shorter; the first form included all forty-five number combinations, but in the final form the list was cut down to forty addition and thirty subtraction combinations, the elimination being by chance. Shortly afterwards (in March, 1920) the whole scale was used in surveys of the school systems of Edinburg, Wabash, and Connersville, Indiana; and norms were established on the basis of data thus obtained.<sup>7</sup>

#### IV. NORMS AND VALIDATION

Results from the three cities (a total of 320 cases) gave norms as follows:<sup>8</sup>

	Percentiles				
	10	25	Median	75	90
Spelling.....	3.5	7.0	12.2	16.6	19.1
Word Recognition.....	4.2	8.8	12.6	17.0	20.9
Understanding of Sentences...	4.5	8.2	11.2	14.5	18.2
Addition.....	7.7	14.0	20.2	26.0	32.4
Subtraction.....	0.0	4.6	15.0	20.5	27.7
Total.....	28.3	39.6	52.3	66.3	82.0

The above standards will indicate, with some exactness, the scores to be expected of a second-grade class.<sup>9</sup> A question, how-

<sup>7</sup> The writer wishes to express her obligations to the superintendents and teachers of Bloomington, Edinburg, Wabash, and Connersville, for their kindness and cooperation in the progress of this work.

<sup>8</sup> The reader who is relatively unfamiliar with percentile distributions may better understand the practical meaning of this table if he considers that all the 320 scores in (let us say) spelling were arranged in order beginning with the smallest, and that when so arranged 10 percent of them were less than 3.5, 25 percent of them less than 7.0, 50 percent of them less than 12.2 (12.2 being therefore the median), 75 percent of them less than 16.6, and 90 percent of them less than 19.1. Similar meanings attach to the percentiles indicated in the table for the other tests.—*Editor*.

<sup>9</sup> The median age for the total group was 8.09; the examining was done the last of March. The median age is, the writer feels, distinctly important. All three school systems have an appreciable retardation. Other systems may have more, or less—that is, in other schools the children may be older or younger than the children from whom these norms were obtained. And it is essential that the maturity of the children be taken account of in comparing their records with the standards.

ever, arises as to the significance which may be attached to such scores with regard to school attainment. It remains to be proved, for instance, that the two "reading" tests really measure reading. A word remains to be said, that is, with regard to the validity of the tests.

About the validity of the spelling and arithmetic tests there can be little question; they are simple samplings of the abilities in question. That is, ability to add is measured by having the children do addition examples, and ability to spell is determined by having them spell. With respect to spelling it may be argued that the use of a list of words in this fashion is not a satisfactory test of spelling ability in a practical sense. But the point can hardly be made as far as the second grade is concerned. Spelling functions in the second grade only as "list spelling"; and the test furnishes this kind of an exercise. But, anyhow, such a theoretical consideration is really beside the point. Sentence spelling tests and timed tests are simply impossible in the second grade, because of the difficulty such young children have in writing.<sup>10</sup>

It remains to be proved, however, whether the reading tests really measure a child's ability to read. It is evident that they involve reading, and, *a priori*, they would be expected to give some measure of ability to read. But definite evidence in the matter is needed. Such validation has been secured in two ways; (1) by relating the scores on each test to carefully obtained teacher's ratings as to the reading ability of the same children; and (2) by relating the scores in the word recognition test to the scores made by the same children in recognizing exactly the same words when shown to them individually. (The examiner gave each child a very careful individual examination to determine the

<sup>10</sup> With the spelling and arithmetic tests, the only question is as to the reliability of the sampling. It may be said, for those interested in such matters, that the coefficients of reliability for these two tests are 0.92 and 0.98 for addition and subtraction respectively, and 0.88 for spelling; the probable errors are 1.19 for spelling and 0.99 and 0.96 for addition and subtraction. The coefficients of reliability for the two reading tests, it may be added, are 0.97 and 0.90; the probable errors 1.01 and 1.57.

The coefficients were calculated by using alternate items of each test to make up two half tests, correlating the two halves and applying Brown's formula. The P. E. was determined by finding the average difference between the two half scales and correcting according to the formula  $P. E. \text{ of the test} = \sqrt{2} \times 0.5978 \text{ P. E. of the half scale}$ .

extent of his acquaintance with these words.) These relations are best expressed by the correlation coefficient; and it may be said shortly that the correlation of the word recognition test with estimated reading ability was 0.73—a surprisingly high correlation for such work, and a striking validation of the test. The correlation of the test of understanding of sentences with estimated reading ability was 0.51—not so high, but a good correlation for a three-minute test with estimated standing. Both correlations are based on the total second-grade population of one of the cities surveyed (154 cases) and may be considered reliable.<sup>11</sup> The correlation of the word recognition test with the individual examinations was 0.82—and this, too, is a very satisfactory result. Thus the validity of the two reading tests is, as such tests go, surprisingly high.

In fact, all the tests of the scale seem to yield sufficiently consistent and sufficiently valid measures to make it trustworthy as an instrument for measuring attainment in the fundamental subjects of the second grade. Certain uses to which such an examination may be put may now be briefly discussed.

#### V. USES OF SUCH SCALES

As was suggested in the first section of the paper, such a scale as has just been described should be of most obvious value for use in school surveys. It should give a means for measuring total achievement in the special subjects of the grade, make possible diagnoses of comparative strength and weakness in the various subjects, and yield a larger measure of the total pedagogical situa-

<sup>11</sup> In obtaining the teachers' ratings, a systematized rating scale was employed similar to the officers' rating scale used in the army. Comment should be made upon the unusual reliability of ratings in reading from teachers in the first and second grades. In these grades the child does his reading aloud, and every day he gives audible proof of his ability or lack of ability to read. The teacher has thus a very definite performance on the part of each child upon which to base her ratings. It is probable that this rating, being based on oral reading, tends to stress vocabulary rather than ability to understand the import of the material read. The lower correlation of the "understanding of sentences" test with estimated reading ability might be thus explained. Each one of the two reading tests apparently makes its own independent contribution as indicating reading ability. The intercorrelation between the two tests is 0.60; the partial correlation of word recognition with estimated ability, understanding of sentences value being constant, is 0.62, and similar partial correlation for the understanding of sentences test is 0.13.

tion in a given class or school than would be possible by employing merely separate tests in the various subjects. However, as was also mentioned in the first section, certain further uses of such scales have also been in mind. Two of these may be briefly indicated.

In the first place, such an examination should be capable of yielding a total score or "achievement total," which could be used as an indication of a child's total status in the fundamental work of the grade in which he is placed. The concept is obvious enough, and need not be elaborated upon. It should only be pointed out that wherever school work is organized according to grades, and not departmentalized according to subject, the grade, and not the subject, is, in many important respects, the unit. Therefore an examination fitted to give a statement of total attainment within the grade would seem the natural type of measuring instrument to use in dealing with many problems which come up in grade-school teaching. At least, such a scale for such uses—e.g., in making section divisions—would seem well worth trying.

In the second place, an examination of this type, if used in conjunction with a group scale of intelligence, should give a very valuable means of measuring the efficiency of teaching. Without such supplementation it does *not*. A fair measure of the work of a teacher cannot be obtained by measuring merely the level of attainment to which she has brought her children. This can only be done by considering what the class has done in relation to what it was capable of doing—by setting over against each other achievement and ability. When such double measures *are* obtained, the information they yield with regard to a teacher's efficiency is sometimes striking. Two second-grade classes in a system recently surveyed by the writer will serve as examples. Both the examination described in the present paper and a group scale of intelligence<sup>12</sup> were given to these two classes. One school was found to have only 22 percent above the median for the entire city in attainment; 33 percent of the children were above the median in intelligence. Apparently this is a school in a less desirable district, and (as often happens), it is not the district to

<sup>12</sup> Pressey, L. W. "A group scale of intelligence for use in the first three grades," *Journal of Educational Psychology*, 10:297-308, September, 1919.



which the best teachers are assigned. The second school shows 74 per cent above the median in attainment, and 62 percent above the median in ability. The teacher in the second school, we may infer, is unusually able. We might, in fact, throw the figures into percents, and say that the first teacher was only 67 percent efficient (since the standing of her class in the school subjects was only 67 percent of its standing in innate ability). By the same method the second teacher would then be regarded as 120 percent efficient. The exact form in which the results are expressed is immaterial.<sup>13</sup> But the notion of thus evaluating teaching by measuring the attainment of a class of children with reference to their ability is, the writer feels, decidedly worth while.

### SUMMARY

The paper may be briefly summarized:

1. The study describes the attempt to combine in a single examination such tests as would yield a summary statement of standing in the fundamental subjects of the second grade.

2. The scale developed consists of four tests, designed to measure abilities in spelling, reading vocabulary, silent reading, and addition and subtraction. The tests are presented, one on each page of a four-page folder, the entire sheet being 9 by 12 inches. The examination takes 25 minutes to give; and the blanks can be scored at the rate of about 60 an hour.

3. The tests have been carefully developed and the items arranged on a P. E. scale. Tentative norms are presented, based on a total of 320 cases—all the second-grade children in three small cities.

4. Data are presented which show the test to be reasonably reliable and valid.

5. It is suggested that the scale should prove useful for the following three purposes: (a) it should be decidedly valuable for use in educational surveys; (b) it should aid in the educational readjustment of individual children by yielding a summary statement of their standing in the fundamental subjects of the grade; (c) when used in conjunction with a scale of intelligence it should give a very valuable index of teaching efficiency.

<sup>13</sup> It should be confessed at once that the forms used above are not statistically by any means all they should be; but they will serve to denote the general nature of the contrasts.

## Editorials

### A BAD SITUATION MADE INTOLERABLE

The teacher shortage is not new. It has always been with us, but it has been masked by the willingness of boards of education and trustees to employ relatively incompetent people. When the Commissioner of Education declared, as he did at the Citizens' Educational Conference last May, that 120,000 teaching positions would be vacant in September with only 30,000 prospective teachers coming from normal schools and colleges, he indicated an alarming condition. Half or more of the remaining 90,000 positions will doubtless be occupied if not filled. The doors of thousands of schoolhouses will be open, and within them certain gestures will be made more or less resembling those of teachers. Customary signs of activity will appear, and the passer-by may derive no small satisfaction in contemplating them. As a way-faring man, though he may be no fool, he will, however, "err therein." For no more insidious fraud is beguiling the public into misplaced confidence than this mimicry of true teaching. A real educational lock-out is far better, for with closed doors and pupils turned away, no one can be deluded into supposing that the constitutional rights of children are being assured.

So it has been in other Septembers, and so it will be in Septembers yet to come. The discrepancy in other years may not be 90,000; but there has been in the past and there will continue to be in the future a shortage less critical perhaps than the present one but nevertheless too real to be anything but ominous.

It appears to be nobody's business to remedy this calamitous condition or even to know the facts in the case. A prominent official in a certain state—a man who ought to know the real conditions if anybody does—stated less than a year ago that the schools of his state "lose 3,000 teachers each year and therefore need 3,000 recruits annually." In the state in question the true number of recruits needed annually is certainly much greater. It

may be as many as 5,000. Indeed, only by supposing that the average length of service for each teacher in that state is over thirteen years, could it be true that only 3,000 recruits would be needed. If the average period of service is actually more than half of thirteen years it is exceptionally long. Moreover, we cannot equate "teachers lost" with "recruits needed" except on the assumption that school conditions are fixed—on the assumption, in other words, that no new positions are created. This would mean no extension of educational service to include new special classes, no additional supervision, and no increase in population. In many states these changing conditions will make "recruits needed" larger by several hundred than "teachers lost." If the official to whom we have alluded manifests the prevalent state of mind concerning the number of teachers needed, we have one reason for perennial shortage.

Because of ignorance of conditions on the part of those who ought to be informed, the teacher-training establishment has in most states no visible relation to the demand for teachers. Even if all the graduates of state-supported normal schools and schools of education became teachers in the state at whose expense they were trained, they would not suffice to fill half the required positions. It is notorious, however, that they do not all serve the state as teachers. In a certain state—one far above the average educationally—it was found that not more than eight out of ten did so. Of the other two, one never became a teacher and the other went outside of the state to teach. Even the eight who served the state did so, in most instances, for but a short time. One was lost at the end of the first year, another at the end of the second year, and a third at the end of the third year. Thus in the state to which we refer not more than five out of ten of the graduates of state supported teacher-training institutions served the state longer than three years. The average length of service of all graduates who become teachers was less than five years. And all this was before the recent crisis.

Thus the demand is enormous, and supplying it is like pouring water through a sieve. Consider a state whose teaching force is 20,000. Such a state would in normal times need about 4,000 new teachers annually. It might, if its salary conditions were normal, expect to import about 400 teachers a year, and if it were

reasonably well provided with privately endowed colleges it might obtain 300 more from that source. It would have to provide from publicly supported teacher-training institutions for about 3,300 positions. This would require quite 4,000 graduates—less, of course, a certain unknown number of certificated teachers of less training. Ten or twelve states have 20,000 or more teachers, and most of them have use in normal times for upwards of 4,000 new teachers a year. In the past none of them has been providing that number of recruits from normal schools and colleges, and at present the methods hitherto used have become pitifully inadequate. The shortage was very real before it assumed its present proportions. The situation has been bad for a long time; it has now been rendered intolerable.

Nevertheless the present crisis brings its advantages. A new sense of values is being developed, and a certain detachment from precedent has been won. It has become clear that, on the basis of standards already accepted in business, teacher-training as a state enterprise is astonishingly ineffective and haphazard. Kindergartners trained as such at state expense are taking graded-school and even high-school positions—and that too when there are more kindergarten vacancies than there are kindergartners to fill them. In a certain state a new course for training domestic-science teachers was established, although the number already being trained exceeded the demand. Students trained for the elementary schools are becoming high-school teachers, despite the fact that they are needed in the service for which they were trained.

It should be somebody's business to know these conditions and to take action with reference to them. In each state a bureau should be established which should analyze the types of teaching service, determine the demand for teachers in each of them, and provide training facilities to meet the demand. Such a bureau should have at its disposal a large number of scholarships which might be awarded now to one type of students and now to another according to the need of the schools for teachers of one kind or another. It should obtain and file records concerning each teacher in service in the public schools and concerning all admissions, withdrawals, and transfers affecting the service. It should have supervision of the placement of graduates of teacher-training

institutions and should see to it that the product of these institutions is delivered to the public schools. In short, it ought to be somebody's business to study not sporadically but continuously the large problems of training, placing, and holding a sufficient corps of competent teachers. It is equally clear that such an authority should have power to put its findings into effect.

B. R. B.

#### WHAT TESTS ARE FOR

Everywhere school people who are not hopelessly numbered with the professionally moribund are becoming interested in the uses of intelligence tests. Within the last year something like ten serviceable intelligence scales for group testing have been published, covering the ranges of ability from kindergarten to university. We may expect that within the next twelve-month several million school children will be tested, and that the number will rapidly increase from year to year. We may be perfectly certain that wide-awake principals and superintendents will discover them to be one of the most valuable tools ever placed in the hands of the school administrator. They do not yet know, no one knows, all the uses which will ultimately be made of this tool; but with the aid of our research directors in the schools we may expect them, through well-planned trial and careful checking-up of results, to find out.

But just as it is impossible to classify all children as sick or well, tall or short, normal or feeble-minded, so it is impossible to classify all school principals as either scientifically progressive or hopelessly conservative, that is, as alive or dead. Many are only in a semi-comatose condition, suffering, it may be, from the results of intellectual malnutrition or the deadening effects of administrative routine. One whose training has been inadequate, or who spends his life in an atmosphere saturated with the poisonous vapors of tradition and routine, needs a good deal of professional vitality to keep pace with educational developments in these days of standardized educational tests, intelligence scales, vocational guidance, supervised study, project teaching, *et cetera*. It is not strange if some suffer noticeably from mental confusion or drop occasionally into a light slumber. Such are not necessarily hopeless. They are easily stimulated into vigorous life by the din of a

new educational battle cry. Tests and measurements are having this effect.

It must be admitted, however, that some are aroused only sufficiently to enable them to go through the motions of participating in the new movement. If it is a question of intelligence tests, these are given, but the results are not used to effect any improvements in grading, classification, instruction, or educational guidance. Nothing is gained beyond the satisfaction of being able to say that children in such and such number have been tested and that such and such interesting facts have been discovered. It is true that even this may have a certain value in alleviating the boredom of tired school people, but it seems necessary to insist upon the fact that tests and scales are designed to serve, not as playthings, but as serious tools.

It is not the purpose of this editorial to try to teach the use of such tools. A manual, of a kind not yet written, would be needed to accomplish that. Meanwhile, any resourceful principal or superintendent who gives serious thought to his problems will be able, in the light of his test results, to devise helpful plans for adjusting the curriculum, the grading system, and the methods of instruction to the individual differences of pupils. Don't play with tests; use them.

L. M. T.

## Reviews and Abstracts

KLAPPER, PAUL (Editor), *College teaching*. Yonkers-on-Hudson: World Book Company, 1920. 583 pp.

It is rather generally admitted that good teaching—I mean teaching as an art—is not as often practiced in higher educational institutions as it is in secondary and elementary schools. There are many reasons why this is so. Some of them are good reasons; others are not. The greater maturity of college students and their relative independence of the teacher, the more commanding knowledge of subject-matter which the college teacher must possess, the lack of any means for training college teachers as high-school teachers are trained—these are among the good reasons, their goodness being inversely in the order of mention. The appointment of college teachers with little or no reference to teaching ability, their promotion in rank with the same disregard of skill in instruction, and their recognition among holders of similar positions throughout the country not because of their eminence as teachers but because of their success as investigators—these are bad reasons, their badness being due not to their lack of cogency as reasons but to their undesirability as facts.

This book is apparently offered as a first step toward the improvement of this condition. The editor says: "This volume is conceived in the hope of stimulating an interest in the quality of college teaching and initiating a scientific study of college pedagogy." Since it was thought that "no college teacher. . . can speak with authority on the teaching of all the subjects in the college curriculum," the plan contemplated the treatment of each of fifteen important subjects by a different author. The contributors were previously furnished with an outline of which the following were the major topics: (1) aim of the subject; (2) its place in the college curriculum; (3) its organization (sequence of courses, electives, etc.); (4) discussion of methods of teaching the subject; (5) moot questions in the teaching of the subject; (6) tests—e.g., of the worth of the subject to the student, of the accomplishment of the aims, and of how much the student carried away; (7) bibliography of the pedagogy of the subject. A good outline, I think; and one which, if it had been followed, would have gone far to realize the editor's hope of an aroused interest in college pedagogy.

But it was not followed. Only a few of the contributors made any real attempt to follow it, and a majority of those who did missed the point. It is clear from the editorial preface and from the "Introductory Studies"—especially those by President Mezes and by Professor Klapper—that the central idea in projecting this volume was "methods of teaching." Yet it is to administrative questions that most of the writers of these chapters devote their space—to the value of their subjects, the place of each subject in the curriculum, and the number of prescribed and elective courses. They have little to offer on method. They usually distinguish the lecture method, the recitation method, and—where it applies—the laboratory method. Their observations, even on these mechanically obvious types of teaching, tend to be platitudinous.

Of the opportunity afforded by their subjects for inductive and deductive work, drill and review, study lessons, lessons devoted to appreciation, to say nothing of project lessons and socialized recitations—of these opportunities they have almost nothing to say. The recognized steps in teaching (preparation, presentation, and others less universal), the technic of questioning, the value of planning—in short, most of the concepts and processes that enter into teaching *as such* are not recognized. Yet most of them have as obvious a bearing on college teaching as on high-school teaching.

Although these writers are rather more likely than the general run of college teachers to be sympathetic to the technic of teaching, some have nothing more to offer than a general sympathy, because they have not themselves been trained in education. Others evidently hold to the notion that "the only equipment for successful teaching is a thorough knowledge of the subject." Professor Lemon in the chapter on *physics* declares: ". . . the teacher must first of all know and understand his subject. Right here lies probably nine-tenths of the fault with our pedagogy. No amount of study of method will yield such returns as the study of the subject itself." Such ideas do not take account of the fact that the scholarship of hundreds of physicists, chemists, psychologists, and linguists does not save them from being notoriously poor teachers.

This attitude, however, is not always taken. Doctor Neumann's treatment of method, for example, in his chapter on *ethics* is entirely competent. Professor Fetter gives a good account of several general methods of teaching *economics*. Professor Galloway has some thoughtful paragraphs on laboratory teaching in his chapter on *biology*. Some practical notes on method in teaching *engineering subjects* are given by Professor Baker. And Professor Winchester's ideas on teaching appreciation in *English literature* are decidedly good.

Besides, there are several chapters which have decided interest despite the fact that they miss the point. One's attention would be at once arrested by Talcott William's essay on *journalism*. Professor Miller's chapter on *mathematics* has dignity and breadth of view. The best written chapter is the one by Doctor Canby on *English composition*. It is the best thing of the kind with which I am acquainted, except Barrett Wendell's "English Composition." The classification of composition teachers into four parties—the Know-Nothings, the Do-Nothings, the Formalists, and the Optimists—is both clever and convincing.

If the purpose of this book was to show not how the methodology of education is actually being applied in college teaching but how it might and should be applied, the purpose would have been better accomplished by a single educational expert with the assistance of specialists. The admirable chapter written by Professor Klapper on the "General Principles of College Teaching" shows that this could be done. But if, on the other hand, the purpose was to give an accurate impression of the way college teachers are thinking about teaching, this device of multiple authorship was precisely the way to serve the purpose. The real value of the book lies, in my judgment, in its exposition of contemporary thought in an important field of teaching. Such an exposition is decidedly important, and no other book, and not many combinations of books, will give it as well as this one.

B. R. B.



TRABUE, M. R. and STOCKBRIDGE, FRANK PARKER. *Measure your mind.* Garden City, New York: Doubleday, Page and Company, 1920. 349 pp.

The use of psychological tests in the army and in an increasing number of industrial establishments has served to bring such tests to the attention of a large and diversified audience. It is not, therefore, surprising to receive a book upon psychological tests which is addressed "to employers and those in charge of the selection, grading, and promotion of workers of every class in factories, offices, and stores; to teachers of all grades, from kindergarten to university; to parents who are interested in ascertaining, and watching the growth of their children's mental development and advancement and desirous of learning something of their own mental capacities and limitations as a guide to the intelligent choice of vocations or professions," and devoted to a general description of mental tests and their use.

In the second part of this volume thirty mental tests (called Mentimeter Tests by the authors) are reproduced and the procedure to be followed in administering them is described in detail. In this list one finds a few tests that are new and a number of familiar ones that have been modified slightly for this particular purpose. They are grouped as follows:

- I. Tests for Infants.
- II. Group Tests for Non-English-Speaking Persons.
- III. Individual Tests for Non-English-Speaking Persons.
- IV. Group Tests for Persons that Read English.

The authors take the position that a much greater service is rendered by giving a large list of tests and accompany this list by advice for the selection of a group of tests for particular purposes. Such advice is given in one chapter of the book. Preliminary or tentative standards are given for each of these tests which are equivalent to (1) inferior ability; (2) low average ability; (3) average ability; (4) high average ability; (5) superior ability.

The combination of authorship and the general character of the book indicate that it was the intention of the authors to present in a practical and semi-popular manner the technical topic of psychological tests. In this endeavor they have been partially successful. The language of the book in some cases, although simple as to vocabulary, is involved as to sentence structure. The authors also failed to make use of the device of topical headings; the book is not accompanied by an index.

W. S. M.

WOODROW, HERBERT. *Brightness and dullness in children.* Philadelphia: J. B. Lippincott Company, 1919. 322 pp.

A letter of Francis Galton written the day before his fifth birthday is dramatically contrasted with the case history of Abbie, an inmate of an institution for the feeble-minded. Francis "can read any English book" and "can say all the Latin substantives and adjectives and active verbs, besides 52 lines of Latin poetry." He can "cast up any sum in addition" and multiply by the numbers from 2 to 11. He knows his "pence table," can "read French a little," and can tell time. On the other hand, Abbie after ten years of courageous instruction has reached her limit. She is twenty-two years old. She can braid corn husks a little, make a bed, and iron an apron. She can

read a few sentences, spell a few words, and write about twenty-five words from memory. She knows the days of the week but not the months of the year and does not know how many fingers she has on both hands. She is about an average feeble-minded person.

Between Francis and Abbie are the children who attend our public schools. From brightness approaching that of Francis with all its wonderful opportunities, to dullness like that of Abbie in which twilight broods over intelligence, Tom and Dick and Harry, Susie and Mary and Jane find their peculiar places. Children of the same age and schooling vary from one to five years in mental capacity, and those who differ from "normal" are more numerous than we suppose.

It is the children of low intelligence upon whom we have centered our attention. To the fact that they are easily identified and are incumbrances in the grades has been added the philanthropic idea of improving their unfortunate condition. Bright children are not so easily identified, are usually a joy to the teacher, and are too self-reliant to appeal to merely sentimental notions about their amelioration. Yet the hope of improving the feeble-minded can be realized only in a very limited way, while, every effort made to give bright children the fullness of life of which they are capable yields gratifying results.

That teachers need a knowledge of the modern psychology of intelligence is the contention of the author, and this book is intended to impart the knowledge. It seems well calculated to do so. It presents, for example, in a simple but effective way the rationale of the Binet-Simon Scale and the evidence of its accuracy as a measuring instrument. On the latter point the author says: "There is scarcely an important criterion of accuracy with which the tests do not comply." Accepting as the author does the construction of the Binet-Simon Scale as the most valuable contribution of psychology to education, he has little to say about the possibility of group testing. The Binet Scale is indeed a "wonderful achievement" but its general use is precluded because of the expense of administering it.

One of the strong features of the book is the care with which its terminology is defined and used. The distinction between mental age and brightness, the meaning of the terms idiot, imbecile, and moron, the difference between chronological, pedagogical, anatomical, and mental age—these are carefully formulated. These formulations have, of course, become much more practicable since the development of a means of measuring intelligence. Thus idiots are defined as "those so deeply defective that their mental development does not exceed that of a normal child of about two years," imbeciles as those whose mentality does not exceed that of a normal child of seven years, and morons as those who grade between seven and twelve years.

The chapters on the relation of physical condition to intelligence are well balanced with reference to the other parts of the book. Their treatment is non-technical, as indeed it should be, and some of the deductions are of great significance. The fact that no child ever becomes feeble-minded after the age of four or five years is brought into significant relation with the fact that the brain reaches almost its full weight at that age. Again, based on the

physical correlate of mentality, the author concludes that the really critical years of a child's life are the years before he enters school. The age of puberty—often regarded as particularly critical—"is incomparably less critical than the first few years of life."

But what is intelligence, or rather, what is its index? For Ebbinghaus it was the combining activities of the mind; for Wundt the ability to give attention or to concentrate; for Binet a sound judgment; and for Stern adjustment of thinking to new requirements. While it is plainly impossible to find any one mental process that can be identified with intelligence, many abilities have been measured and their reliability as indices has been studied. The author takes up at some length these various capacities. They are examined under the heading of simple sensory capacities, more complex capacities such as association, memory, and attention, and complex mental processes.

The treatment of these traits and capacities consists largely in a summary of the ways that have been devised for measuring them, and the extent to which each of them when so measured correlates with general intelligence. In these chapters the author departs from the helpful treatment of his subject which he exemplifies at the beginning and again toward the end of his book.

After taking up certain questions of heredity and pronouncing the dictum "that heredity rather than environment is the preponderating factor in the causation of individual difference in mental capacity" and after supporting this contention by some interesting evidence as to the heredity of feeble-mindedness and human eminence, the author devotes two exceedingly good chapters to practical implications for school procedure. "Granted," he says, "that original abilities are inherited, they are not, however, inherited in their final form." "The business of the schools is to see that the child has the chance to show what is in him." Practical suggestions follow as to what may be taught and what may not profitably be attempted to be taught to children having specified amounts of mental defects. Similar suggestions are offered with reference to gifted children. Here he makes a strong plea for the importance of this type of work. He says: "If we continue to use a large portion of our energies in training the children of the lower levels of intelligence without simultaneously devoting special attention to the exceptionally bright we shall produce an unbalanced system which must in time tend to pull downward the general level of education."

It is our opinion that this book is entitled to receive and will receive a wide and appreciative reading.

B. R. B.

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Walter S. Monroe, University of Illinois, Urbana, Illinois.

**Wisconsin Association for Educational Research** The organization<sup>1</sup> of the Wisconsin Association for Educational Research indicates the rapidly growing interest of the school men of that state in the study of quantitative as well as qualitative problems of education. The personnel of the association includes representatives from practically every field of educational work in the state. The charter membership includes teachers, supervisors, superintendents, and members of normal school and university faculties who are studying educational problems.

The purpose is not only to encourage the scientific study of educational questions but to keep the members closely in touch with what each is actually doing in the way of educational investigation and experimentation. By means of a bulletin issued at regular intervals the members can announce intensive studies and ask for co-operation or for the results of similar studies completed or under way by other members in the same or similar subjects. They can learn definitely and economically to whom to go for specific information and can avoid a repetition of unnecessary effort.

The state department of education in Wisconsin is well represented in this group. Dr. W. W. Theisen and Mrs. Cecile White Flemming, supervisors of educational research in the state department, have been influential in the formation of the organization. The officers for the year 1919-1920 are Supt. C. J. Anderson of Stoughton, president; Mrs. Cecile White Flemming, state supervisor of educational measurements, secretary-treasurer.

**A Short Method of Determining Probable Error** It is the purpose of this communication to present an easy method of determining the relation of the probable error to the Pearson coefficient of correlation.

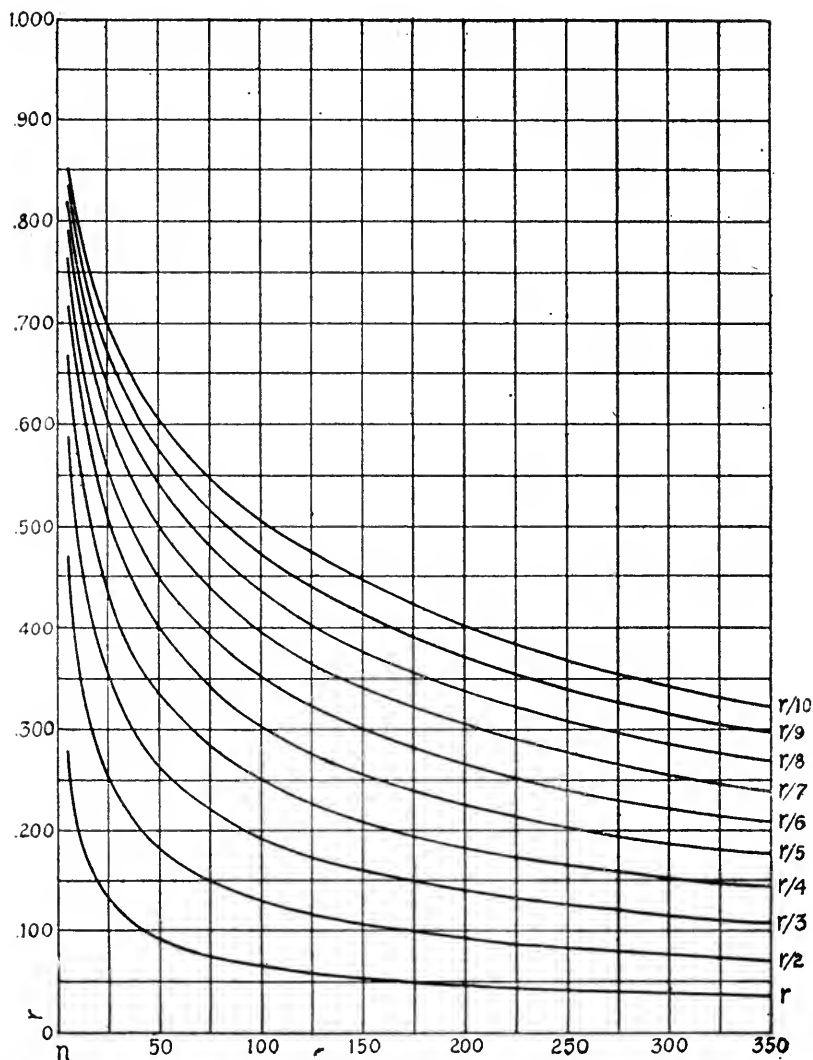
$$1-r_2$$

The formula  $P. E. = .67449 \frac{1-r_2}{\sqrt{n}}$  has been solved previously for

many values of  $r$  and  $n$ , and the results have been arranged conveniently in tables, such as those found in Rugg's *Statistical Methods Applied to Education*, page 404.

Referring to such tables the value of P. E. is determined and its relation to  $r$  is noted. Since its relative value with respect to  $r$  is of greater importance than its absolute value, an easy method of determining this relationship was considered desirable.

The method was quite simple. It consisted in substituting, first,  $P. E. = r$  in the formula, and then solving for  $r$  through the various values of  $n$  from 5 to 350. The same process was repeated with  $P. E. = r/2, r/3, \dots, r/10$ . By plotting values of  $n$  on the abscissa, and values of  $r$  on the ordinates of the accompanying diagram, the several curves of P. E. were plotted.



By referring to this diagram it can be determined by inspection that if  $r=0.250$  and  $n=100$ , P. E.  $=r/4$ , or P. E. (if one wishes the absolute value) equals 0.63. Again if  $r=0.300$  and  $n=50$ , P. E. lies between  $r/3$  and  $r/4$ . Since these ratios determine the reliability of  $r$ , such an easy means of determining their values has proven very useful to the writer.

H. J. BAKER,  
*Assistant Director, Psychological Clinic,  
 Detroit Public Schools.*

Through the cooperation of five teachers in the eighth grade of the Wellington city schools the data for this study were secured at the end of the school year 1918-1919. Seventy-six pupils took the Otis Group Intelligence Scale. In addition, independent ratings were made by the five teachers with instructions to consider only general intelligence and ability, without regard to classroom achievement. Letter ratings were used under the following restrictions. The highest rating should be given to eight pupils or approximately 10 percent; the next highest rating should be given to 15 or approximately 20 percent; the median rating to 30 or approximately 40 percent; the next to the lowest rating to 15 or approximately 20 percent; and the lowest rating to 8 or approximately 10 per cent. The records of the school also furnished the year's grades of the 76 pupils in the subjects taught by the five teachers who gave the intelligence ratings.

The Pearson coefficient of correlation between the teachers' ratings and the grades issued by the teachers was 0.882, between the teachers' ratings and the Otis scores 0.598, between the school grades and the Otis scores 0.582.

The more significant results are found in the correlation of the teachers' ratings with each of the separate tests in the Otis test and in the correlation of the total scores in the Otis test with the scores made in the separate tests.

OTIS SUB-TEST	CORRELATIONS WITH	
	Teachers' Ratings	Otis Total Score
1	.587	.598
2	.259	.585
3	.029	.432
4	.415	.811
5	.425	.510
6	.511	.642
7	.343	.639
8	.316	.531
9	.583	.390
10	.368	.510

It is, of course, obvious that the number of cases here used as a basis for study is insufficient to warrant any final conclusions. It would seem, however, that the various tests of the Otis Scale are of different value. This suggests the possibility of deriving a shorter test for school uses.

A. K. LOOMIS.

*Principal, Summer County High School, Wellington, Kansas.*

The Bureau of Educational Research of the Northern Normal and Industrial School was established in 1917 for the purpose of aiding the schools of the state in studying scientifically certain types of school problems. Most of the work of the Bureau has been that of giving and scoring well-recognized, standardized tests. At first these tests were given in the schools and sent to the Bureau of Educational Research for scoring. This placed a great burden upon the Bureau and there was much delay in getting results back to the teachers. Furthermore the director of the Bureau, M. R. Staker, has always felt that standardized tests would accomplish the best results only when the teachers out in the schools did their own scoring and made their own interpretations. If the tests are valuable, they should be handled by the teacher and not by some student of education who is gathering material for a thesis. Perhaps it is true that any new movement must start with the investigator gathering data for theorizing, but the time has now arrived when educational tests should be put into the hands of the teacher in order to obtain the very best results from their use.

This Bureau is attempting to render service in the following ways:

1. The Bureau is offering a thorough course in educational measurements to regular normal school students in attendance. In this course the student is given an understanding of all the statistical methods needed in the administration of educational tests. Standardized tests in all the subjects are studied; students are given practice in giving these tests to children, in scoring test papers, and in suggesting possible remedies for discovered weaknesses.

2. The Bureau is keeping on hand a supply of well-recognized tests which are sold to the schools at cost. Instructions and any help teachers need in using these tests may be had by simply asking.

3. The Bureau realized that superintendents often wish to do standardized testing but find that their teachers are not sufficiently trained. The Bureau therefore has offered to give teachers a thorough course in educational measurements. A superintendent may act as conductor for a study group and the Bureau will send lessons and other helps to the group. The work has been so carefully planned that even if the superintendent himself is unfamiliar with standardized testing, he can study this with his teachers. Teachers completing this course are required to give tests to their own pupils, work up the results in all possible ways as suggested by the Bureau, and send the conclusions to the Bureau of Educational Research for correction. At present the Bureau is conducting this work in twelve study centers. It is possible for a group to finish this course in about ten weeks. After the group has finished, the superintendent has an enthusiastic group of teachers ready to help him carry on scientific testing. The Bureau wishes that county superintendents would take this work up with their rural teachers. So far only a few superintendents have undertaken the work, but surely more will do so next year because it is an established fact that the Bureau can carry on this work through the study center. It is the plan of the Bureau to continue this method of reaching out to the schools until every child in this vicinity of the state shall feel the effects of its work.

The director of the Bureau has compiled a brief treatise on the statistics of educational measurements which attempts to make clear the hidden mysteries of this

subject. In other words this little text talks in a simple way about a simple thing to the teachers. The work has become so simple that very seldom is the Bureau required to make any further explanations. Any educator, wishing a copy of the little text on the statistics of educational measurements by M. R. Staker, may secure one by sending \$1.00 to the Bureau of Educational Research, Northern Normal and Industrial School, Aberdeen, South Dakota.

### Educational Research in Cities of Over 10,000

In order to find out the status of educational research in the city school systems, a letter was sent in January, 1920 to the superintendents in cities having a population of 10,000 or more. The letter was not sent, however, to cities where a member of the National Association of Directors of Educational Research was in charge of this type of work. Letters were also sent to a few cities of less than 10,000 population where there was special reason for thinking that research work had been provided for.

In the circular letter the following information was requested: (1) Has provision been made for the systematic use of standardized tests or other scientific methods in your school system? (2) Name the official title of the person in charge of the work if such provision has been made.

Twenty-two cities in the United States have persons in charge of research work in the public schools who are members of the National Association of Directors of Educational Research. In addition to these an affirmative answer to the first question was received from 159 cities out of a total of 330 replies. In 108 of the 159 cities the superintendent was named as the person in charge of the work. In the remaining 51 cities some person other than the superintendent was named. Frequently the official designation of this person indicated that he had other responsibilities. It is, however, very significant that in so many cities this research work in the public schools has been recognized to the extent of making definite provision by the designation of some person other than the superintendent to have charge of the work.

A summary of the reports by states is given in the table below. In addition to the 159 cities which reported provision for the systematic use, 72 others stated that some form of research work was carried on irregularly.

State	Number Sent	Replies Received	Systematic Use	Irregular Use of
Alabama.....	8	2	0	1
Arizona.....	4	2	0	0
Arkansas.....	9	5	3	2
California.....	23	10	4	5
Colorado.....	15	9	6	2
Connecticut.....	30	9	5	3
Washington, D. C.....	1	1	0	0
Florida.....	7	1	1	0
Georgia.....	19	4	0	1
Idaho.....	7	3	2	0
Illinois.....	38	20	11	2



State	Number Sent	Replies Received	Systematic Use	Irregular Use of
Indiana.....	34	11	5	3
Iowa.....	20	5	4	0
Kansas.....	21	10	9	0
Kentucky.....	9	5	2	1
Louisiana.....	7	3	2	1
Maine.....	10	1	1	0
Maryland.....	3	1	0	0
Massachusetts.....	62	31	6	10
Michigan.....	33	15	9	3
Minnesota.....	11	7	4	1
Mississippi.....	7	5	2	0
Missouri.....	19	10	5	2
Montana.....	7	3	2	1
Nebraska.....	3	2	1	0
New Hampshire.....	8	4	1	2
New Jersey.....	36	18	10	5
New Mexico.....	3	2	1	0
New York.....	51	21	7	4
North Carolina.....	13	2	1	0
Ohio.....	46	17	10	4
Oklahoma.....	9	7	3	2
Oregon.....	8	4	2	2
Pennsylvania.....	67	30	19	3
Rhode Island.....	9	4	0	1
South Carolina.....	6	2	0	1
South Dakota.....	5	1	0	1
Texas.....	25	6	0	4
Utah.....	4	2	0	0
Vermont.....	4	2	1	0
Virginia.....	10	6	3	0
Washington.....	12	5	5	0
West Virginia.....	9	4	1	2
Wisconsin.....	21	14	7	3
Wyoming.....	5	4	4	0
Total.....	758	330	159	72

# National Association of Directors of Educational Research

(E. J. ASHBAUGH, *Secretary and Editor*)

The members of the National Association of Directors of Educational Research are both busy and modest. The secretary has been impressed with this fact again and again. At different times a general invitation has been extended for news items and contributions which would tell of the good work being done. Very few answers have been received. But—a hurry-up call in midsummer for specific information on the following points: summary of testing activities during May and June; plans for the coming year; teaching activities of the summer; and possibility of attending the next annual meeting next February brought 34 replies in ten days. And the testimony of testing work done, to say nothing of the other lines of research which was undoubtedly done but not mentioned, was the most positive evidence available of the first statement in this paragraph.

Of the thirty-four replies received before these items were written, seventeen members stated that they expect to attend the next annual meeting at Atlantic City; four more stated that they hoped to do so, and three that they were undecided. Four stated that it would be impossible and six did not answer that particular question. Since a number of those from whom no replies were received reside in the east, the prospects at this early date look good for a large attendance at that time.

Eighteen of the thirty-four taught one or more courses allied to the work of the Association in various universities and normal schools this summer. The following taught in their own institutions:

De Voss, Kansas State Normal School, Emporia, Kansas.  
Harlan, State Normal School, Lewiston, Idaho.  
Staker, Northern Normal and Industrial School, Aberdeen, S. Dakota.  
Buckingham and Monroe, University of Illinois.  
Greene, Horn, and Ashbaugh, University of Iowa.  
Fordyce, University of Nebraska.  
Gray, University of Chicago.  
Kelley, T. L. and McCall, Teachers College, Columbia.

In addition, the following are also teaching:

Alexander, University of Chicago.  
Anderson, University of Michigan.  
Courtis, University of Chicago.  
Lane, University of Southern California.  
Smith, Kearney State Normal School.  
Theisen, University of Wyoming.

There are doubtless many others who are spreading the good news and inspiration of educational research work, especially in the fields of measurement and accounting, in other universities and normal schools. And these who are so doing are not all

members of the Association by any Means. The teaching profession is undoubtedly rapidly becoming aware of some of the advantages attending the use of these instruments.

An examination of the educational tests given during the spring of 1920 reveals a long list which has been used in one or more places. Most noticeable in terms of the number of tests used and the number of places using them (on the basis of these thirty-four replies) are: Courtis Series B; Monroe Silent Reading and Spelling, the last of which seems to have been in terms of various tests made from the Ayres Scale, Ashbaugh-Iowa Scale and Jones Demons. Among those mentioned less frequently were: Arithmetic: Woody; Woody-McCall; Boston Fractions; Cleveland Survey; Monroe's Diagnostic; Stone's Reasoning; Buckingham's Reasoning; and the Monroe Reasoning. Miscellaneous tests mentioned one or more times were: Charter's Language; Greene's Organization; Thorndike's Alpha 2; Van Wagenen's History; Brown's Latin; Henmon's Latin; Trabue's Language; Courtis' Geography and general writing tests.

Among the intelligence tests mentioned were those by: Haggerty; Otis, Pressey; Johnson; Van Wagenen; and the Army and the National Intelligence Tests. The following plans for next year in this line will give some indication of the tendency toward the use of Intelligence testing.

Pittsburgh expects to use from sixth grade through high school, Boston in grades VI-VIII in two schools; Detroit in first grades; St. Paul in seventh and eighth and to selected children; Santa Ana, Cal. in grades I to VI with the Otis and National Intelligence Tests in grades VII-XII; Beaumont, Texas in grades I and IX for classification purposes. Omaha and Leavenworth, Kansas also have large plans for the use of such tests but are less specific concerning them.

Other types of activities of the members which may be of interest to the membership of the Association are reported as follows:

Richardson, who reported on "Campaign Method in Elementary Education" at the Cleveland meeting and whose paper has appeared in this Journal, announces his plan for a similar campaign this coming year in spelling. Perhaps the way to teach spelling most economically is by an intensive campaign for a few weeks each year only. Who knows that it is not?

Anderson at Detroit reports plans for testing and developing tests in typewriting, chemistry, algebra, and foreign languages. We shall expect something of superior worth to come forth within the next two or three years as a result of these plans.

Talbert reports that he hopes to develop practical ability (both general and specific) tests for use among adults in industry and business.

Alexander is continuing his work on application of salesmanship and advertising discoveries to school publicity. He is also making a study of the secondary school teachers of his state.

Cram, one of our new members, joins the faculty of Iowa State Teachers' College to work in the Extension Division in training the teachers in service, devoting most of his time to tests and measurements.

Staker at Aberdeen announces that he has been instrumental this past year in organizing the South Dakota Educational Research Association and is now its secretary.

Buckingham announces so many things we cannot print them all but one of special interest is the organization of a superintendents' conference to meet the first time this coming November.

We regret to announce the loss of another of our members. Mr. M. C. Lefler, formerly director of research, Lincoln, Nebraska, schools, has become sales manager of the University Publishing Co. of that city. We extend to him all good wishes in his new work.

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It will be of interest to the members of our Association to learn, if they have not already learned, of the advancement of President Haggerty to the Deanship of the school of Education at the University of Minnesota. This deserved promotion came to Dr. Haggerty when Dr. Coffman advanced from the position of dean of education to the presidency of the same university. We may remark incidentally that we are likewise pleased that the presidency went to Dr. Coffman. What is more appropriate than that an educational man should be president of an educational institution?

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We were about to record "with no small satisfaction" the appointment of Dean F. J. Kelly to the position of Associate Director of Educational and Mental Tests at the University of Michigan. We learned just in time, however, that Dean Kelly is to remain at Lawrence and assume an administrative position which had been newly created. He seems to be about to become adviser to the chancellor as well as to others in authority at the University of Kansas. Details from Dr. Kelly had not reached us at this writing. We know enough to be confident, however, that the position is an exceedingly important one.

Dr. Ballou, we are informed, has recently been elected city superintendent of schools at Washington, D. C. It seems to be impossible to keep good men at research work. Perhaps, however, as they rise to new heights they will be in a position to exalt research through the direct activities of others.

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Now that you are back on the job again or soon will be and the summer play time is over, will you not drop the secretary a line telling us something you forgot before? And if you didn't do it before, remember every day may be the beginning of a new year. It is all up to you. The world is full of opportunities. What share of them are you going to seize?

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## THE USE OF GROUP MENTAL TESTS IN THE GUIDANCE OF EIGHTH-GRADE AND HIGH-SCHOOL PUPILS<sup>1</sup>

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The purpose of this discussion is to show the use of group mental tests in the guidance of eighth-grade and high-school pupils. Tests of classroom accomplishment have shown a wide variation in the work of pupils of the same grade. Mental tests have shown that there is just as wide a variation in mental capacity. The evidence that I shall set forth in this paper tends to prove that this difference in mental capacity is one of the most important factors to be considered in the guidance and classification of children in the high school.

When the child enters the high school, he has the opportunity to elect certain courses and subjects. Very few children, however, can form judgments based upon sound principles regarding their fitness for different courses of study. Choice of subjects is more apt to be governed by popularity of instructor, ease of securing a passing grade, friendship, whim or chance, than by any serious study of the needs of the case.

### GUIDANCE IS NEEDED

Pupils who go from the eighth grade to the high school are in serious need of guidance in their program making. The pupil is then making a change into a new type of school life with greater freedom, greater independence, and greater danger of being lost in the irregularity of the day's program. He is also at an age in which steady guidance and counsel are needed.

I wish to present here an illustration which will show the need for the guidance of such children.

<sup>1</sup> An address delivered before the National Association of Directors of Educational Research at Cleveland, Ohio, February 26, 1920.

A group mental test was given to a number of classes in Oakland. The blank used was composed of a battery of six tests, numbers 2, 3, 4, 5, 7, and 8 of the Otis Group Intelligence Scale as now published by the World Book Company. The median score for one large eighth-grade class was 109. This is higher than the median score (97) made by the combined ninth-grade classes of the city. On the contrary, the median score of another large eighth-grade class was 58. This is scarcely equal to the median score for our sixth-grade classes of the city as a whole (61). At the beginning of the next term the pupils from these two schools presented themselves to the same high school for enrollment in the ninth grade. There was practically nothing to guide the high-school enrolling committee except the fact that each pupil had a certificate of graduation from the eighth grade. The children from these two schools mingled with four hundred others from various eighth grades of the city. In almost every high-school class, children of the keenest mentality were enrolled by the side of children with the slowest and dullest minds. It is easy to picture the mental confusion of many of these pupils. In each class in the high school, some were disgusted or disinterested because the work was too slow, others were discouraged because they could not keep up and could not understand.

#### GROUP MENTAL TESTS ARE AN AID IN CLASSIFICATION

A careful study of this eighth-grade high-school problem during the past two years has revealed the following facts:

1. That the scores from the Otis Group Intelligence Scale (given in 40 minutes) had a high correlation with the scholarship rating given by eighth-grade teachers after teaching the pupils for a whole semester.

2. That those pupils who, on completing the eighth grade, quit school to go to work had a very much lower median test score than those who went on to high school.

3. That those who went to business colleges and to vocational schools had a median test score higher than those who quit, and lower than those who went on to regular high school.

4. That those who dropped out of high school during the first year had a lower median test score than those who remained in high school for the entire year.

5. That those who made the lowest test scores were commonly among the ranks of the high-school failures in scholarship.

I have data to substantiate each of the five points mentioned above but the scope of this article will not permit me to present them here.

#### CAPACITY OR CLASSROOM EXPERIENCE—WHICH?

By a study of age and progress data, I found that in School A, one of the large elementary schools in the best section of our city, the amount of acceleration was very nearly the same as was found in many of the schools in the poorer sections. Mental tests and tests of classroom accomplishment in reasoning, reading, etc., showed that the median score, grade for grade, in this school always stood at the top or very nearly at the top of the lists for the city.

By a study of the progress data and the mental test data for the city as a whole, it was clearly evident that each school set up standards of scholarship which varied according to the general capacity of the pupils who attended that school. This appears to me to be proper within certain limits, but there comes a time when the pupils from these schools with varying standards are thrown together into one group. Then we must know, not merely accomplishment, but also capacity to learn.

Apparently then, the high mental capacity of the pupils in general in School A was being employed somewhat in maintaining a higher standard of school work, but this superior capacity did not secure any particular advantage in the time spent by pupils in each grade.

After conference with the principal and faculty of this school, we decided, as an experiment, to segregate the pupils at the beginning of the eighth grade into two groups with a view to accelerating one group. To aid in this segregation, the six tests of the Otis series mentioned above were given to the 86 pupils entering the eighth grade in September, 1918. The names of pupils were arranged in rank order from highest to lowest according to the test score. Three teachers who had formerly taught these pupils were then asked to judge whether those near the median score should go into the accelerated group or into the regular group. This resulted in shifting a few pupils whose scores stood below the median to the accelerated class, and a few whose scores stood above the median to the regular class. As finally arranged, 46 pupils were placed in the accelerated, and 40 in the regular class.

Table I shows the distribution of the test scores for each of these groups, and Table II the distribution of chronological ages.

TABLE I. DISTRIBUTION OF OTIS SCORES FOR THE REGULAR AND ACCELERATED GROUPS AT THE BEGINNING OF THE EIGHTH GRADE

TEST SCORE	NUMBER OF PUPILS	
	Regular Group	Accelerated Group
110—114.....	.....	1
105—109.....	.....	7
100—104.....	.....	5
95—99.....	.....	3
90—94.....	.....	3
85—89.....	4	10
80—84.....	1	5
75—79.....	9	4
70—74.....	5	3
65—69.....	3	2
60—64.....	4	.....
55—59.....	5	1
50—54.....	2	.....
45—49.....	5	.....
40—44.....	1	.....
35—39.....	1	.....
30—35.....	.....	1
Total.....	40	46
Medians.....	68.3	88.5
Range of middle 50 percent of scores	56 to 77	80.5 to 102.5

There were 40 pupils in the regular and 46 in the accelerated group. The median test score in the regular group was 68; in the accelerated group, 88. The range of scores for the middle 50 percent was 56 to 77, for the accelerated class 80.5 to 102.5. There was, therefore, no overlapping of the middle 50 percent of the two groups. The median chronological age of the pupils in the regular group was 13 years, 11 months, and in the accelerated group 13 years, 2 months. Thus the accelerated pupils were on an average nine months younger than the regular group when they began the eighth grade.



TABLE II. DISTRIBUTION OF AGES FOR THE REGULAR AND ACCELERATED GROUPS AT THE BEGINNING OF THE EIGHTH GRADE

CHRONOLOGICAL AGE	NUMBER OF PUPILS	
	Regular Group	Accelerated Group
16—0 <sup>a</sup> .....		
15—9.....	2	1
15—6.....	2	1
15—3.....	1	1
15—0.....	3	0
14—9.....	1	2
14—6.....	2	1
14—3.....	4	2
14—0.....	4	2
13—9.....	4	5
13—6.....	8	2
13—3.....	2	4
13—0.....	4	7
12—9.....	0	6
12—6.....	3	8
12—3.....		2
12—0.....		0
11—9.....		1
11—6.....		1
Total.....	40	46
Medians.....	13-11	13-2
Range of middle 50 percent of ages...	13-6 to 14-7½	12-9 to 13-11

<sup>a</sup> "16-0" means 16 years, no months; "15-9" means 15 years, 9 months, etc.

Both classes did good work at the beginning, but the accelerated class moved very rapidly. It gave fair promise of finishing the entire eighth grade in one semester, when, after 55 days of work, the influenza epidemic closed the schools.

At the end of the first semester, the order went forth from the superintendent's office that all classes should be regularly promoted as though the semester's work had been completed. With misgivings on our part this accelerated class—which had spent only 55 days in the eighth grade—was promoted to the high school.

At the end of the school year in May, the pupils of the regular group finished their year's work and were likewise promoted to the high school. Forty-one pupils of the accelerated group entered X High School—a large high school with more than 2,000 students—in January (spring semester), 1919. Twenty-seven out of 40 of the regular group entered the same high school in August (fall semester), 1919.

The average age difference at the beginning of the eighth grade was nine months. Therefore, upon entrance to high school, the average age of the accelerated pupils was seventeen months younger than that of the regular pupils. The accelerated pupils were thus much younger and, according to the mental test, much keener mentally than the normal pupils. All were placed in high school without the high-school faculty members knowing about the experiment. In the high school, there was no attention paid to segregation of these pupils. The members of the accelerated group have now finished two semesters of work and the regular class members, one semester.

#### HIGH-SCHOOL SCHOLARSHIP RECORDS

According to the general custom, all students took four regular subjects. Each should, therefore, make four credits per semester. The accelerated group made 160 credits; it should have made 164. The regular group made 104 credits; it should have made 108. Each group, therefore, made very nearly the total number of credits theoretically expected of it.

Table III shows the scholarship records for the accelerated pupils during their first and second semesters in high school.

TABLE III. HIGH-SCHOOL MARKS. ACCELERATED GROUP

SCHOOL MARKS	CREDITS, FIRST SEMESTER 41 PUPILS		CREDITS, SECOND SEMESTER 38 PUPILS	
	Number	Percent	Number	Percent
1.....	27	17	21	13
2.....	75	47	74	48
3.....	51	32	50	32
4.....	5	3	11	7
5.....	2	1	0	0
Total.....	160	100	156	100

Table IV shows the same facts for the regular pupils during their first semester in high school. We may note certain comparisons between the accelerated and regular groups on the basis of the

TABLE IV. HIGH-SCHOOL MARKS. REGULAR GROUP. 27 PUPILS

SCHOOL MARKS	CREDITS	
	Number	Percent
1.....	5	5
2.....	44	42
3.....	47	45
4.....	7	7
5.....	1	1
Total.....	104	100

first semester's work. The accelerated group was three and one-half times as successful in earning 1's and still had 5 percent more 2's. Combining the 1's and 2's as high marks, 64 percent of the credits earned by the accelerated group were high, while only 47 percent of those earned by the regular group were high. Combining the 4's and 5's as failures, the accelerated group failed in 4 percent of its work, while the regular group failed in 8 percent of its work. In other words, the accelerated pupil made four high marks against three for the regular pupil, and the accelerated pupil had just one-half as much chance for failure as the regular pupil.

#### SCHOLARSHIP EVIDENCE FROM ANOTHER GROUP

Another class of fifteen pupils from School A—a class which had taken a full semester plus the 55 days in the eighth grade—entered X High School on the same day with the accelerated group described above. Many of these pupils were in the same high-school classes with the accelerated members. Table V shows their scholarship marks. A comparison of this table with Table III will further emphasize the superiority of the members of the accelerated group (judged by school marks) over the members of regular classes. The former had been selected mainly by a forty-minute mental test. They had spent only 55 days in the eighth grade and had not covered all the required work of that grade. Moreover, they were much younger than regular pupils.

This experiment gave us evidence that there was mental capacity in many a child that could easily be used to net that child

returns in acceleration without endangering his scholarship. It also indicated that superior mental capacity was a greater guarantee to good scholarship than was the mastery of all the items in the course of study of the previous grade.

TABLE V. HIGH-SCHOOL MARKS. REGULAR GROUP. (NOT TESTED)

SCHOOL MARKS	CREDITS, FIRST SEMESTER 15 PUPILS		CREDITS, SECOND SEMESTER 14 PUPILS	
	Number	Percent	Number	Percent
1.....	1	2	2	4
2.....	24	41	23	43
3.....	27	46	21	40
4.....	2	3	5	9
5.....	5	8	2	4
Total.....	59	100	53	100

On the basis of this experiment and others of a similar kind, we are now using group mental tests extensively in the upper grades as an aid in the segregation of pupils into groups of more homogeneous mental capacity. During the past two years, 20,000 pupils in Oakland have been given the group mental test and the results are daily becoming more valuable in educational and vocational guidance.

#### A SUPERIOR GROUP AND A SLOW GROUP IN HIGH SCHOOL

I shall give one other example of the use we are making of these test results. A few weeks ago, more than one hundred students presented themselves for admission into Y High School from various eighth grades of the city. The Bureau of Research furnished the principal of the Y High School with the mental test score of each of these pupils and the scholarship rating which each of them had earned in the elementary school. The enrolling committee scheduled 29 of the most superior pupils by test and by scholarship for Section A in English and algebra. These pupils were allowed three other electives. The committee scheduled fifteen of the slowest pupils by test and by scholarship for Section C in English and business arithmetic. They were encouraged to take two other electives. The rest of the pupils were scheduled in Section B.

The median test score for Section A was 109, for Section C, 58. This means to us that the pupils of Section A have a mental

capacity equal to the average tenth-grade pupil, and that Section C has a mental capacity somewhat similar to that of the average seventh-grade pupil. The median age of Section A was 13 years, 11 months; for Section C, 15 years, 7 months—an average difference of more than a year and a half.

Section A and Section C English were taught by the same teacher. Section A English moved ahead freely; the teacher could scarcely find enough work to keep the class busy. She reported: "I have to pile on the work to keep them out of mischief, and they are happy to do it." In Section C English the ordinary work was found entirely too difficult. Work was adapted to the needs of the class and all went smoothly. The pupils were happy and were working industriously. The regular teacher fell ill and a substitute teacher, who knew nothing of the segregations, took the two English classes. It was a school joke until the end of the second day, when she reported, "There must be some mistake, because all of the 'stupids' seemed to be in one class."

The teacher of Section A algebra reports: "I am doing the usual algebra work and much supplementary work. I am also covering the work more rapidly. I have absolutely no trouble with discipline and the attitude of the class is the very best. The pupils have a quick mental grasp and repetitions are seldom necessary. I am enthusiastic over the work of this group."

Section C takes business arithmetic instead of algebra. Plain arithmetic and accuracy in the four fundamentals is stressed. The class is interested and working faithfully.

An interesting incident occurred in the enrollment. By mistake a member of the committee assigned two A pupils to the C section and two C pupils to the A section. Within a week the respective teachers of these four pupils reported their names back to the office as "hopeless misfits," and the error in assignment was discovered and corrected.

I could give numerous other illustrations of class segregations of this same general character, and without a single exception the results have been highly satisfactory.

Lest I be misunderstood, however, I wish to sound this warning. We do not believe that the group mental test is an infallible guide. It is merely an important tool that can be used to advantage in the study and placement of groups and of individuals. Many

times the test score for a certain individual disagrees with that pupil's school record.

For this there are several possible reasons. A pupil may not be well when the test is given and thus fail to put forth effort; he may be stubborn and not try; he may get nervous and frightened and fail to do himself justice; he may be very slow and thus make a low score. Sometimes a pupil who makes a low score has such industry and interest in school work that he succeeds better than those who are brighter but less faithful. On the other hand, it is difficult for any pupil to make a high score without actually earning it. A pupil does not feel poorly or get rattled and thus do better work than he is ordinarily capable of doing. A high test score, however, does not necessarily mean that the pupil will do good work in school. He may be lazy, lack interest, or be in love. A dozen things may tend to interfere with his using the mental capacity he actually possesses.

The test booklet of the individual often presents facts of excellent diagnostic value. As was stated before, the test booklet which we have used most is composed of a battery of six tests. We have norms for each of these six tests. Suppose that a pupil scores well above the median in some of the tests and then "goes to pieces" apparently on one or two tests. It is clearly evident that his total test score may not be an accurate measure of his ability. Occasionally, we have a pupil who is very slow, but very accurate. This is also discernible from a careful analysis of the test booklet.

Whenever the test result does not agree with the school record of the child, further study of the case is insisted upon to see if the cause of the difference can be discovered.

### CONCLUSION

We have found that group mental tests are a great aid in the segregation of pupils into groups according to their capacity to do school work. The greatest benefit will arise from the discovery of and more effective training of superior ability. On the other hand, however, much good will result from the discovery of the dull pupils—those who cannot reason well and for whom book work is especially difficult. When discovered, these pupils may be guided into courses and programs which fit their capacities and needs. Failure and discouragement may thus be avoided. More self-respect and better citizenship will result. Better educational guidance will naturally produce better vocational fitness for the coming worker and citizen.

## EDUCATIONAL MEASUREMENT IN GRAND RAPIDS

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On July 1, 1919, the board of education of Grand Rapids, Michigan created a new position of the rank of assistant superintendent of schools. The encumbent of this position was to have charge of educational tests and measurements, census and attendance, and general educational statistics. An explanation of the plan of organization and the program of work adopted may be of interest to administrative officers contemplating the introduction of a testing department in their respective school systems.

For nine years Grand Rapids has had a Binet testing department, and for five years the Courtis Standard Practice Tests in Arithmetic have been in use. A specially trained tester has administered the Binet tests, and the class teachers have given the Courtis tests. Many of the teachers have taken courses in educational measurement in normal schools, colleges, and universities.

One year prior to the creating of the new testing department, the board of education appointed the writer assistant principal of the Junior High School with a half day of teaching and a half day of experimental testing. In connection with this testing work the writer conducted two classes for training teachers of the city in educational tests and measurements. One of the courses was organized as a regular course for credit in our Junior College. It consisted of 32 two-hour formal recitations meeting once a week from four to six o'clock. At the end of the course, each successful member of the class handed in a four-thousand word thesis on the subject assigned at the beginning of the course, namely, "The Use of Standardized Tests in the Improvement of Instruction." Each of the class members paid a fee and received four hours of college credit.

The other course consisted of twenty formal recitations of one hour each. It covered the same ground as the college work but in a less thorough way. Although no credit was given for this work, each member who had attended at least 75 percent of the formal class periods received at the end of the course a certificate

entitling him to do his own standardized educational testing. The members of the college class were given the same kind of a certificate. Thus out of about four hundred and twenty-five regular grade teachers about one hundred and fifty had had some sort of training in the use of standardized tests when the work of the department began last September.

The courses which had been given the previous year were again offered in 1919-1920. The enrollment was approximately two hundred and forty. Within about five weeks these two hundred and forty individuals were started on administering tests to pupils in their own rooms. These, together with the one hundred and fifty of the previous year, gave us a force of about three hundred and ninety people competent to give and score tests, tabulate results, and figure medians, quartiles, etc. With this force, and a clerk in the director's office, the testing program was launched.

Before describing the plan in detail it should be said that the work of training the teachers for this undertaking has been a very pleasant one. They seemed to welcome the movement because it gave them a check on the accomplishments of pupils' work in their respective rooms. The writer believes that the administration of standardized *educational* tests belongs rightly in the hands of teachers, and believes also that they will measure the children in their own rooms as well as or better than any stranger if only they are trained thoroughly in the work.

During the year the writer had planned to test every normal child in the entire school system from the third to the eighth grade inclusive in silent reading, fundamentals and reasoning in arithmetic, spelling, language, and writing. At Grand Rapids about nine thousand children belong to these grades. The educational tests were to be followed by a group mental test for those who did very poorly or very well, and this in turn by the Binet Test for all those who did poorly on both the educational and group mental tests. All this, however, was not accomplished and for several reasons. For one thing the program proved much too elaborate for one year. To date (March sixth) two educational tests have been given—the Cleveland-Grand Rapids Arithmetic-Survey test, and Monroe's Silent Reading test. About eleven hundred ungraded children have been given the



group mental tests, and about three hundred have been measured by the Binet tests. However, the work promises to go much faster for the remainder of the year since the organization has been improved. A special tester was secured to give part of the group mental tests, and a few teachers of ungraded rooms volunteered their services in scoring, tabulating, and reporting results.

A second cause of delay in carrying out the program has been the "Flu" epidemic. For several weeks the attendance of both teachers and pupils has been broken up so that it was advisable to discontinue the work for a while.

The teachers give and score the tests, tabulate the results, and figure medians and quartile deviation for their own rooms. Those who have had training give the tests for those who have not had training. The teachers send in a report together with each child's test paper to the director's office. Their figures are either checked in the office or by members of the writer's classes. They are then compiled by the director, and the city score is ascertained by grades, by operations, or by whatever phase of the work is important. A report is then sent to the principal of each building showing him the city results, standard scores, and the results for his own building. Principals and teachers are asked to assist in a study of deficiencies, when they are revealed, and to apply such remedies as are apparently needed.

Often measurements of this type are fruitless. Many tests are given merely from a detective standpoint—that is *to find out* without remedying. The main objectives in Grand Rapids are to classify individuals according to mental levels and accomplishments, and to stress instruction where it is needed. For several years special instruction has been provided for the subnormal and ungraded pupils, and recently provision has been made for introducing special instruction for the supernormal children. In fact classes for gifted children have been conducted in the junior high school since the fall of 1918 and recently such classes have also been organized at South High School. Some grade schools have attempted special work based on teachers' judgments alone. It is hoped that within a year there will be not only such classes organized throughout the city but that a set of records will have been obtained whereby accelerates can be properly classified.

The writer has organized a system of records whereby every child in the school system who has taken educational tests can be traced from the eighth grade to the place where he took his first standardized test, and whereby a complete record of his scores may be obtained. The same has been done for mental tests by the head of the mental testing department, Mrs. Cordelia Creswell. One may judge the character of this work of classifying children according to mental levels from a statement made by Dr. Goddard in a recent address to the effect that "Grand Rapids has made the best beginning in determining mental levels of any school in the United States." Much credit for this accomplishment belongs to Mrs. Creswell.

From the work done to date, several conclusions can be drawn:

1. If any considerable number of children are to be tested, the training of teachers in the administration of tests is the first factor of importance unless an army of trained testers and scorers can be afforded.

2. We believe it is better to have each teacher do her own testing, although one teacher from each building might be trained to do it.

3. When teachers are used as testers, the director must be a good systematizer in order to bring about uniformity of procedure.

4. No matter what system of testing one uses, the results must be rechecked and in the hands of the respective teachers within a few days after the test is given. But teachers should not wait for this. As soon as they have obtained their results they should at once set about using them without waiting for the rechecking to be done at the central office.

5. In order to obtain the greatest good from standardized tests, the principal of the building and the supervisors should be students of scientific education, so as to assist teachers in understanding results and in applying remedies.

# THE SELECTION OF SILENT READING TEXTBOOKS

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In the discussions of elementary-school teachers and supervisors, no problem is more prominent than that of the improvement of the various abilities in silent reading. There are many reasons why this should be so. In the first place, the recent development of reading tests has given the problem a precision which it formerly lacked. Grade standards are gradually being worked out so that teachers now have a definite basis upon which their results may be compared with those obtained in other schools. In the second place, the recent experiments in the field of reading seem to show clearly that ability in silent reading can be surely and markedly improved. The third, and in some ways the most significant reason for the present interest in the problem, is to be found in the growing recognition that success in directing and improving the study habits of grade and high-school students depends, to a very large degree, upon the improvement of abilities in silent reading. The recognition of the intimate relation between reading and study is very important. On the one hand it helps to offset the over-emphasis upon the mere administrative factors in directed study. On the other hand it emphasizes use of reading as the means of efficient work with books.

The discussions of silent reading have commonly emphasized but two qualities, viz., speed and comprehension. But when the problem of improving ability in silent reading is viewed in its relation to the problem of improving study habits, it becomes clear that two additional qualities must be considered. One cannot leave out of account the ability to organize what is read in terms of the reader's purposes. Neither can one neglect those technics which will help to insure that what is read will be remembered.

On inquiring into the ability of a pupil to work with books we may accordingly ask four groups of questions:

1. Can he quickly locate data which he needs and read them

rapidly? This involves skill in the use of the index and the table of contents as well as ability to skim or to read rapidly.

2. Can he comprehend clearly what he has read? Has he a well-developed accuracy conscience which forbids guessing or the acceptance of hazy notions?

3. Has he the ability to find, select, and organize data so as to answer most effectively the purpose at hand? Does he recognize irrelevant data?

4. Does he understand the technics by which one can increase the amount remembered and provide for future use of the information gained?

If these four groups of abilities are accepted as representing the most important phases of silent reading, it would follow that any book which is to be used to train pupils in silent reading should either be specifically arranged to afford proper practice in exercises which have been found valuable for developing each of these abilities, or it should be easily adapted to such exercises. What should be some of the outstanding characteristics of such a book? A brief and partial list of the requirements follows:

1. It must be rich in factual and informational data. This means that the materials should be of the sort with which people *work*. Exposition, technical description, and argumentation based on concrete data—all of these are suited for exercises in silent reading. Such selections may be tested rigorously, so that any tendency to do hurried or half-baked work can be detected at once and counteracted. This is particularly important where the selection is to be used for speed exercises.

2. The content of the selections should be worth while for its own sake, well written, and scrupulously accurate. The exercises, if properly planned, should fix this valuable information in the minds of the students. Moreover, selections which are rich in content value tend to insure interest in the exercise and to guarantee practice with the kind of material which will be read in later life, while exercises containing data of no intrinsic worth produce an artificial situation and are inferior from every point of view.

3. Most of the selections should be of sufficient length to occupy the most rapid readers for several minutes. If occasional intensive paragraph study is desired, paragraphs from these

longer selections are quite as valuable, and in many ways more valuable than the isolated paragraphs. Long selections are particularly essential for exercises to develop the ability to organize. As a matter of fact, long exercises are essential to the development of any of the four abilities in silent reading which were enumerated above.

4. The silent reading text should contain some selections which are not in themselves a summary, that is, where data are given in great detail. It is not essential that this material be unorganized. Rather it should be rich in concrete material and organized on a basis different from that required in the exercise.

5. Some if not all of the selections should be preceded by a problem or problems which guide the pupil in his reading. This is especially necessary in exercises for speed and in exercises for organization. To ask a pupil merely to read rapidly, without giving him something definite to find through his rapid reading, is somewhat analogous to looking at one's feet while dancing. The actual process of reading should be in the background, the attention being centered in the problem and in the data which constitute the answer to it. Therefore, a pupil must have a purpose which will afford a criterion for the selection and organization of relevant data, and for the rejection of that which is irrelevant.

The exception to this principle is the exercise in making a digest, or the determination of the general characteristics of a selection. For such an exercise, however, the problems which introduce the selection may be ignored.

6. Each selection should be followed by appropriate tests of comprehension of the detail given in it and by tests of the ability to organize this detail. These tests must be formulated so as to test rigorously and should require no data not explicit or implied in the article. Such questions as, "What do you know about the author of this selection?" are worthless for the purposes of silent reading, and may indeed prove to be positively harmful. If they are to be included at all, it should be made clear to both teacher and pupil that the questions constitute no part of the silent reading drill. It seems much better to omit all questions which do not test the pupil's ability to comprehend, organize, or remember what he read in the selection. Occasional questions may be

asked for which the answer is: "The selection does not give data by which this question can be answered." In other words, the ability to know when a selection does not furnish relevant data is an important one.

7. The book should contain a first-class index and table of contents. Some of the selections should have paragraph and marginal headings, and some should not. These requirements, if satisfactorily met, will insure proper material for exercises in finding material rapidly through using the index, through using the table of contents, and by skimming.

8. Of course, the mechanical makeup of the book should be good. In fact, first-class printing is particularly necessary in this type of book.

One requirement not ordinarily met by texts in other subjects is desirable, i.e., the length of the selection as measured by the number of words should be indicated not only for the selection as a whole, but by paragraphs. It is possible that this information should be given at the end of the selection rather than in the margin, since in a speed exercise the appearance of numbers in the margin might prove a distraction and influence the reader to speed up his reading in a more mechanical fashion.

It is essential that there should be a good manual to accompany the exercise books. This manual should contain a pointed discussion of the problems involved in developing silent reading, and should give specific directions for teaching and testing each lesson.

What has been said implies, of course, that most literary selections are inferior for silent reading exercises of the type which characterize *work* with books. In general, the measure of good reading in literature is not so much efficiency as appreciation. The rigorous testing which is essential for the development of silent reading is impossible with most literary selections and when attempted will react unfavorably upon the appreciation of literature. In other words, both silent reading ability and literary appreciation suffer from such a practice. The literary reader will still have its place in connection with the development of literary appreciation. Literary appreciation should, however, be sharply distinguished from silent reading ability. If literary readers were to be used for the development of silent reading ability, it would

probably be better to read extensively than to subject a small number of selections to the dissecting exercises so often found in connection with the teaching of literature, or to the severe drill and rigorous testing usually found in silent reading lessons.

Until texts are prepared which satisfy the requirements laid down above, it will probably be better to depend upon textbooks and supplementary readers of the content sort, such as Keller and Bishop's *Industrial and Commercial Geography* and Chamberlain's *How We Are Fed*. These books do not, of course, contain directions for silent reading exercises, but the material in them is adapted to such exercises. Book companies might do well at this time to develop manuals of silent reading exercises to accompany the most widely used supplementary books in geography and history.

## GROUPING BY STANDARDIZED TESTS FOR INSTRUCTIONAL PURPOSES

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Scientific diagnosis of educational work and the application of remedies to fit the needs shown by such diagnosis are doing more to improve teaching than any other procedure in the school world. Most teachers work blindly, not knowing whether they are getting the results they should. When they *do* know the nature of their results and realize that the product of their teaching is unsatisfactory they do not know how to diagnose the trouble or what corrective measures to use. Usually if a teacher can diagnose the disease of an educational patient she can find a remedy which at least partially cures. Without a diagnosis, however, she hunts in a helter-skelter way for devices and methods. Having found them, she throws them indiscriminately at all the pupils, hoping that they may hit the individuals who need them.

After scientific tests have been given a class the teacher knows, in about ninety cases out of a hundred, what the trouble is. She should then place children with like needs in groups and apply the remedies which will bring each group up to standard in the point in which it is weak. Grouping children makes teaching easier and more satisfactory.

Of course, it will be argued by some that under the present school organization, this cannot be done; that it will require additions to the teaching force to handle all these groups. We grant that there is some force in such an argument, while insisting at the same time that much can be done without any radical reorganization. I shall give as proof of this an account of the work done in grouping children in reading at the Myrtle Hill School during the fall and winter last year.

We began by giving in the fourth, fifth, and sixth grades a silent reading test of our own making. Of course it was not standardized but it revealed those who read most rapidly and comprehendingly. The fourth grade was divided into two groups.



The group which read most comprehendingly and at a good rate was assigned to the regular room teacher, and I took those who fell low in their speed and in their ability to grasp thought. If there had been four or even three teachers available at that period, the better way would have been to divide the pupils into three or four groups, as follows: (1) those who read very rapidly and comprehendingly; (2) those who read comprehendingly but slowly; (3) those who read rapidly but with little comprehension; and (4) those who read neither rapidly nor comprehendingly. Since but two teachers were free, only two groups were formed. The same idea was carried out in the fifth and sixth grades, except that there we had the four groups since four teachers were available.

We were interested to find that our grouping corresponded very closely to that made after the Denver Department of Measurements and Standards had brought out the results of a city-wide use of Monroe's Silent Reading Test. This test, therefore, was the second given the Myrtle Hill pupils. Using it as a basis and taking class work into account also we redivided the pupils into more or less advanced groups. Large distribution charts were made on sign cloth; one for speed (Figure 1) and one for comprehension (Figure 2).

Each pupil after being told his score in rate and in comprehension was shown how to find his "dot," and to discover his position in regard to the standard for his grade. He was also shown how his work compared with that of his own classmates and with that of members of other classes. After these charts had been left in the classrooms for a short time, they were publicly exhibited, much to the interest of pupils, parents, and teachers.

After about four weeks' work, the Courtis Silent Reading Test was given. We found that in the fifth and sixth grades, where there had been four groups working, only three pupils fell below the standard in rate (Table I). Ten were found to have reached a stage where, according to the test, no more training was needed in either comprehension or rate. They were excused from reading as a formal study. One of the four teachers took charge of this group during the reading period, devoting the time to whatever the individuals needed most. Some worked on arithmetic, some on spelling, etc. At the close of the semester this group was given

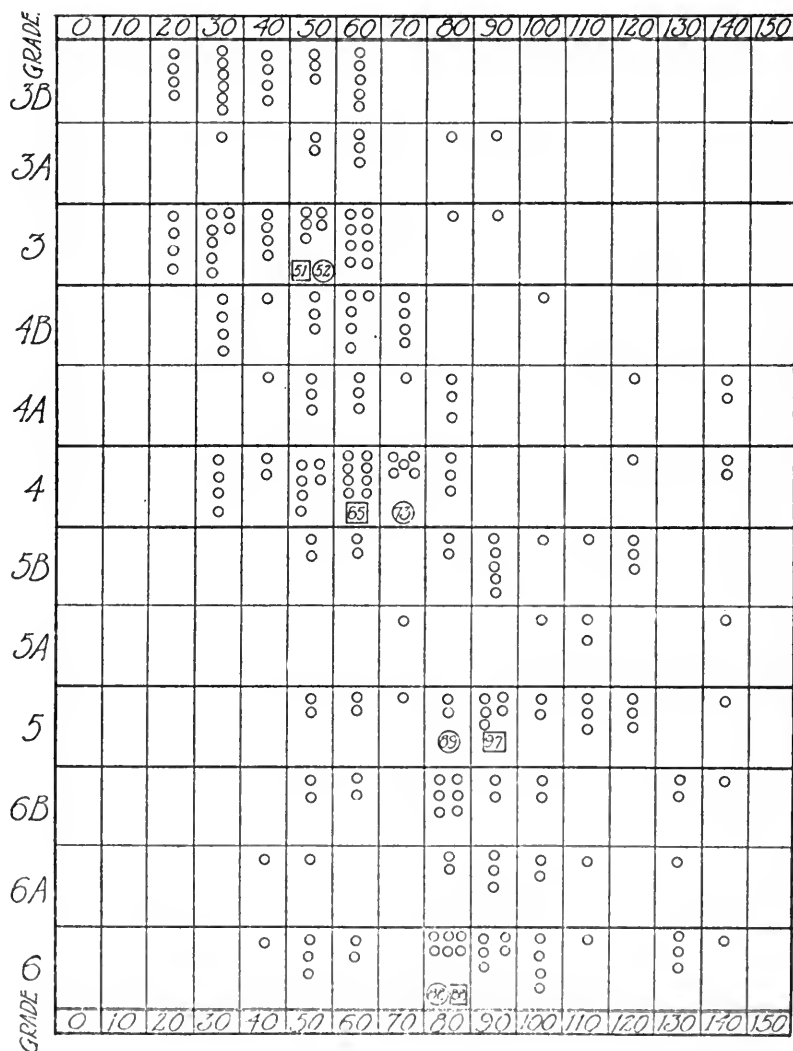


FIGURE 1. SPEED-READING DISTRIBUTION CHART. MONROE  
SILENT READING—MYRTLE HILL SCHOOL. STANDARD  
MEDIAN: ○ CLASS MEDIAN: □



TABLE I. DISTRIBUTION OF PUPILS ACCORDING TO INDEX OF COMPREHENSION AND NUMBER OF QUESTIONS ANSWERED (RATE)

Questions Answered	Index of Comprehension										Total	
	Less than -5	-5 to +5	6-39	40-69	70-79	80-84	85-89	90-94	95-99	100		
70												Rate satisfactory
65												
60					1		1	1	1		4	
55					2	1	1	4	4		12	
50					2	3		6	1		12	
45				1	1		2	3			7	
40				1	2	1	2	4	3	1	14	Rate too slow
35								1			1	
30			1				1				2	
25												
20												
15												
10												
5												
0												
Total			1	2	8	5	7	19	9	1	52	
	Guesswork			Comprehension poor					Comprehension satisfactory			

TABLE II. DISTRIBUTION OF THE PUPILS IN THE FIRST GROUP ACCORDING TO SPEED AND QUALITY OF SILENT READING (FORDYCE)

Quality	Speed (percents)				
	85	90	95	100	Total
100				4	4
95					
90	1			3	4
85					
80					
75				2	2
70					
65				1	1
Total	1			10	11

Class Averages: Speed 99%; Quality 89%; Efficiency 82%

percent in quality and another scored 85 percent in speed and 90 percent in quality. From this we are led to believe that it is quite possible that, after having acquired a certain standard, a pupil of a given grade may be excused from reading as a formal subject until he has reached a higher grade, where his reading is below standard for that grade.

In the second group we placed those whose index of comprehension according to the Courtis Silent Reading Test was between 90 and 94; in the third group those whose index of comprehension was between 80 and 89; and in the fourth, all those whose index of comprehension was below 80. We are now hoping that when the next test is given, no one will be below standard in speed and that the majority of each group will be ready to enter the next higher one.

It is too early to make any final deductions but we are watching with interest a number of points. Never have there been as few complaints from parents in regard to children's "marks." This may be a coincidence, but we think not. A child's "marks" when obtained in part from a standardized test, are more satisfying than they are when based on one teacher's judgment.

Though there is much labor connected with giving and following up these tests, the teachers seem to feel them worth while and do not resent them as they did at first. It is not so hard to teach pupils when they are well grouped and each pupil knows his objective. So long as they continue to see marked gain, teachers will welcome the movement and not rebel against the added work.

In my experience I have found no one thing which has done so much to motivate the work as the grouping system based on the standardized test. After we had been working for a few weeks in groups in reading, the city department sent out a test in arithmetic. The pupils asked at once whether groups were to be formed in that subject too. We have carried out the same idea in arithmetic and penmanship and hope soon to do so in other subjects.

At the suggestion of one of the teachers each instructor is going to keep a book, showing each child's score in each test, educational and intelligence, for the year. This book will be passed on with the class to the next higher grade. Every child's record for every year will thus be kept permanently. It cannot fail to be of value to the teacher and to the parent.

# CURRICULUM CONTENT OF A HIGH-SCHOOL SPELLING COURSE

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## THE SCOPE OF INVESTIGATION

Scientific methods of determining the curriculum in spelling have been based on the principles of frequency of use and of frequency of error. On the one hand frequency of use may give the content for the lower grades, although even there the arrangement of the material should be determined by a consideration not only of frequency of error but also of the difficulty of learning. On the other hand, frequency of error may serve very well in determining the directed curriculum in spelling for junior and senior high-school students. Such students have reached a stage of development that makes it practicable to disregard the principle of difficulty of learning; and the principle of frequency of use drops largely out of consideration because the students can spell from 98 to 100 percent of all the words they use.

The present study is limited to the following questions: (1) What is the technic of using the frequency of error in determining the directed curriculum in spelling for high-school students? (2) What standards of efficiency in spelling do high-school students attain? (3) Is society demanding too high standards? (4) What words with their frequency of error do high-school students misspell? (5) How does this list of words compare with a list derived on the principle of frequency of use, e.g. Ayres' Thousand Commonest Words?

This is the report of an investigation in 1914-1915 which extended over eight months of the regular session of nine months in a typical small high school of a town of 1,000 inhabitants in northern Missouri. The high-school faculty consisted of the superintendent and three assistants. About 120 students were enrolled, 25 percent of whom came from the surrounding rural schools. Spelling as a subject was not taught in the high school and the spelling taught in the town grades and in the rural schools consisted of daily lessons of ten to fifteen words, recited orally, or written, during a recitation period of five to ten minutes.

## TECHNIC OF GATHERING AND HANDLING DATA

The following directions for gathering and handling the data were prepared in a seminar of Professor W. W. Charters at the University of Missouri.

*(a) General Directions to Teachers*

I. Require each pupil, when he writes any school work either in school or at home, to put in the upper left-hand corner of the first page his name, the date, and the number of words in the exercise.

II. Underline in red the incorrect words in all the written work of the students. (Formal spelling lessons not included.)

III. After the usual use has been made of the papers they are to be finally returned, unfolded, to the teacher's desk and kept.

IV. The papers of each set (or assignment) are to be kept separate and arranged in strictly alphabetical order. On the top of each set place a sheet of paper on which is written the name of the course, the year (I, II, III, IV), the section (if any), the date when the assignment was written, and the teacher's name. Tie each set together without folding the papers.

V. Send these papers to the superintendent's office on Monday mornings.

VI. In the case of loose-leaf notebooks collect them once a week, and handle as other written work, except that a paper clip is to bind together the papers of any one student, and the material is to be returned to the teacher and the students as soon as the office is through with it. When notebooks are not loose leaf they are to be collected on the first and fifteenth of each month. Mistakes are to be marked and the books sent to the office. They should be returned without delay.

VII. In spelling, an abbreviation must have a period at the end; contractions must have apostrophes. Disregard hyphens, syllabication, and capital letters except that if proper nouns or adjectives are not capitalized they are to be counted as errors. In the written work of foreign-language courses count only English words. Simplified spellings should be accepted only when a pupil uses them deliberately. In mathematics the student should not count mathematical symbols among the "number of words"; he should count only full words and abbreviated words.

VIII. Immediately after having examined the first set of papers, see the person in charge of the study concerning difficulties, if there are any. Do not mark a second set until you have seen him.

IX. At the beginning of the school year but only then, students may be told about the study which is being made. They should be cautioned about always using periods after abbreviations and capital letters for proper nouns. If a student enters late he may be told these things privately.

*Note:* We are attempting to get at the normal spelling errors and teachers must, therefore, handle the spelling question just as they always have, giving no more attention to spelling with the class than usual.

(b) *Directions for Keeping a Class Record*

I. The following sample is submitted:

## CLASS RECORD SHEET

Subject—English

Year—1

Section—2

Name	No.	Date									
		9/29		9/30		10/3		10/4		etc.	
		E	W	E	W	E	W	E	W	E	W
Adams	101	6	127	6	180	3	250	4	160		
Anderson	107	2	150	1	240	2	125	5	350		
Brown	502	2	271	0	160	4	308	1	190		
etc.											

II. "Date" is that upon which the set of papers to be tabulated was written. Names of students are to be arranged in strictly alphabetical order. In the number column set down the students' numbers as described in later paragraphs.

III. In each dated column enter under "E" the number of errors and under "W" the total number of words in each paper.

IV. This record should be kept on loose-leaf, ruled paper, uniform in size for all the records. At the end of the year the teacher of each section should give a statement of the method of handling the spelling errors with the class.

(c) *Directions for Making Out Error Slips*

I. Errors should be copied on slips about 4 inches by 1 inch as follows:

awful	9/29 Eng. I 124
aweful	

*Explanation:* The error is in the center; the correct spelling is in the upper left-hand corner; 9/29 refers to the date; Eng. refers to subject; I refers to Freshman course; and 124 refers to the number of the pupil, in a strictly alphabetical list according to classes—Freshman, Sophomore, Junior, Senior, and irregular students.

II. Regular Freshmen are students in the Freshman class who are spending their first year in this high school. They are to be numbered from 100 to 199. Regular Sophomores are those who have credit for a full year's work, are carrying a second full year's work, and are spending their second year in this school. They are to be numbered from 200 to 299. Juniors



similarly described are to be numbered from 300 to 399. Seniors similarly described are to be numbered from 400 to 499. All other students (called irregulars) are to be numbered from 500 on. If there are over 100 students in any group (except the last), the same definitions should be used, but other numberings should be devised.

(d) *Directions for the Distribution of Error Slips*

I. For preliminary distribution there should be kept five boxes, one each for regular Freshmen, regular Sophomores, regular Juniors, regular Seniors, and irregulars.

II. When the error slips have been made out and the information tabulated on the class record sheet, then the error slips should be at once thrown into the appropriate box. *Note:* This means that an irregular in a Freshman class will have his errors thrown into the box for irregulars.

III. For further distribution sort the slips in each box into 26 divisions according to the first letter of the correct spelling (as shown in the upper left-hand corner of each slip). Thus there will be an A division, a B division, etc., through the alphabet. Then arrange the slips in each division in strictly alphabetical order. Each division may then be tied into a bundle and appropriately marked for future use.

NUMBER OF ERRORS PER TEN THOUSAND WORDS WRITTEN

From material thus obtained, a number of significant tables were derived. One of these—here presented as Table I—shows the relation between the number of errors and the number of words written. This is expressed as the number of words misspelled per ten thousand. It affords a reversed index of spelling efficiency—reversed in the sense that the less it is the greater the efficiency. Table I shows that 956,730 words were written by all the high-school students and that in writing these words the students made 3,388 errors, or 34 errors per ten thousand words written.

According to the errors per ten thousand words, the classes, arranged in descending order of ability, are Senior, Junior, Freshman, and Sophomore. The superiority of the Freshmen over Sophomores may be due to the fact that a large proportion of the written material in the freshman course in ancient history consisted of abstracts of supplementary readings—a type of writing in which few errors in spelling are likely to occur. One course common to all the classes was English, and the reversed index of efficiency is as follows: Freshman 71, Sophomore 41, Junior 32, and Senior 15. These data indicate that if this school is typical, the more advanced the class is in high school the higher its spelling efficiency is likely to be.

TABLE I. RELATION BETWEEN NUMBER OF ERRORS AND NUMBER OF WORDS WRITTEN

Class	No. of Words Written	No. of Errors	Reversed Index of Efficiency <sup>a</sup>
Freshman.....	286,700	1,142	39
Sophomore.....	126,629	660	52
Junior.....	417,864	1,281	30
Senior <sup>b</sup> .....	125,537	305	24
Total.....	956,730	3,388	34

<sup>a</sup> Reversed index of efficiency is 10,000 times the number of errors divided by the number of words written. Instead of being percent of errors or number of words misspelled per hundred, it is the number misspelled per ten thousand.

<sup>b</sup> If the written work from the shorthand course is omitted—a course in which there are actually students from all classes—the entries in Table I for seniors would be: No. of words written, 119,010; No. of errors, 242; index of efficiency, 20.

### STANDARDS OF EFFICIENCY

One of the factors to be considered in curriculum construction is the demands made by society in general. This is particularly true in the case of spelling and fortunately for the schools the standard is clearly defined. In this field there is practically no place for originality. If the stenographer makes one error in spelling in a note of a half dozen words or in a letter of three or four pages, the error must be corrected because the employer knows that the receiver of the letter will be surely prejudiced against the sender if every word is not spelled correctly. The advertising manager exercises great care to see that all words in his copy are correctly spelled, because he knows that one spelling error will detract from the efficiency of his selling talk. Any number of such illustrations could be obtained from various fields of social activity. The preceding discussion may be stated quantitatively by saying that society demands 100 percent efficiency in spelling.

How do these students measure up to the standard of efficiency demanded by society? In order to answer this question the number of words written by each pupil and the number of errors he made were tabulated. Next the average number of words written per page was determined by averaging a random sampling of pages. It was found that the students wrote about 150 words to the page. The number of words written by each pupil

divided by 150 gives approximately the number of pages written by him. The numbers of errors per page may then be found by dividing the total number of errors by the number of pages. Thus Table II was derived. Data are given only for pupils who wrote 5,000 or more words.

TABLE II. DISTRIBUTION OF PUPILS ACCORDING TO THE NUMBER OF ERRORS PER PAGE

Errors per Page	Number of Pupils
0	10
0.10	11
0.20	10
0.30	5
0.40	7
0.50	11
0.60	8
0.70	4
0.80	4
0.90	4
1.00	2
1.10	1
1.20	2
1.30	2
1.40	0
1.50	1
1.60	0
1.70	0
1.80	2
1.90	2
2.00	0
2.10	1
Total	88
Median	0.51
Average	0.56
25-percentile	0.21
75-percentile	0.80

The table should be read as follows: ten pupils made zero to 0.099 errors per page; eleven pupils made from 0.10 to 0.199 errors per page; ten pupils made from 0.20 to 0.299 errors per page; etc.

The significance of the table will be more easily grasped if the reader will remember that 0.10 errors per page means that on ten pages of written material one word was misspelled, or that one word in 1,500 was misspelled; that 0.20 errors per page means that on ten pages of written material two words were misspelled, or that two words in 1,500 were misspelled.

The median number of errors per page was 0.51 or one misspelled word for every two pages of written material. This means that half the students spelled better than this and that half of them spelled worse. The 25-percentile of errors per page was 0.21. This means that one-fourth of the pupils in the high school misspelled less than 2.1 words on ten pages. The 75-percentile indicates that three-fourths of the pupils made less than 8 errors on ten pages.

We may consider these figures in relation to the standards in spelling demanded by society. Perhaps the 25 percent of the pupils who misspelled less than two words on ten pages of written material would be called *good* spellers by society at large—we are not sure that they would not be called *excellent* spellers. How high a percent of accuracy does this standard call for? Two words misspelled in 1,500 would give a misspelling of approximately one-tenth of one percent or a standard of excellence of 99.9 percent. The fact that 75 percent of the pupils misspelled less than eight words on ten pages means, approximately, that they misspelled less than one-half of one percent of their written words. That is, three-fourths of the students reached a standard of at least 99.5 percent. Table II shows that the poorest speller averaged 2.9 misspelled words to the page or to 150 words written. This pupil misspelled approximately 2 percent of the words he used and his percent of accuracy was therefore 98.

There is no doubt whatever but that society would consider the poorest speller, the student whose standard of efficiency was 98 percent, unfit for any position in life demanding spelling. Yet, the merchant is considered an excellent collector if 96 percent of his outstanding bills are paid; the good doctor does not expect to cure all his patients; the good lawyer does not win all his cases; and the morally good man is excused if he fails to live up to his standards at all times. In what human affairs does society condemn an approach to perfection which is represented

by 98 percent? Are not the social objectives in spelling instruction too high?

### SUMMARY OF MISPELLED WORDS

In the following summary of words misspelled by the high-school students, the figures in parentheses in the first paragraph indicate the frequency of error. The words preceded by an asterisk are those of the high-school list that are also found in Ayres' Thousand Commonest Words. Only the words misspelled three or more times are given.

*Misspelled 10 or more times*—parliament (92), \*too (47), \*until (31), quantity (25), \*their (23), vassal (22), \*there (21), \*government (21), \*separate (19), \*finally (19), \*they (18), straight (16), didn't (16), \*water (15), Bibles (15), council (14), growth (13), iodine (13), \*coming (13), \*lose (13), isosceles (12), \*disappointed (11), perpendicular (11), quantities (11), Delaware (11), \*to (11), \*and (10). Christians (10). *Total 28.*

*Misspelled 9 times*—\*business, color, emetic, \*especially, Jews, loans, proteins, \*religion, \*through. *Total 9.*

*Misspelled 8 times*—\*beginning, generally, \*height, succeeded, usually, writing. *Total 6.*

*Misspelled 7 times*—addressed, ammonia, apothem, chronicle, equivalent, loses, monastery, \*people, perimeter, \*together, \*whether. *Total 11.*

*Misspelled 6 times*—alcohol, all right, colleague, \*divide, enemies, hydrochloric, Indian, \*knew, \*off, proteids, suspense, systematizes, tried, \*volume. *Total 14.*

*Misspelled 5 times*—\*always, apparatus, \*believe, bequeathed, centigrade, carriage, carrying, clothes, developments, disappeared, exhausted, Gracchus, heretics, immediately, monasteries, naturally, \*new, \*piece, \*principal, thoroughly, \*thought, tournament. *Total 22.*

*Misspelled 4 times*—\*although, ancestors, appearance, \*because, belief, \*born, closely, completely, compliment, conscience, conquer, conqueror, different, disappears, divine, duchess, exhausted, expedition, feeling, \*fourth, hopeless, horny, knot, major, \*meet, milliner, misshapen, \*money, \*pleasant, privilege, procedure, prophecy, receiving, restaurant, \*school, spadille, spear, successful, \*surprise, teaspoonful, testament, \*very, warriors, zinc. *Total 44.*

*Misspelled 3 times*—abbess, accompanied, \*against, aluminum, architecture, arrived, assassins, Antonines, awoke, baptism, \*became, \*behind, Bob's, buoyed, \*by, calendar, cherry, choked, Christianity, comedies, committed, cooky, couldn't, crystals, cylindrical, depth, descendants, disappear, divided, drawer, dried, embryo, existence, Flodden, followed, gas, grease, grew, Hadrian, Hallowe'en, Haynes, hereditary, \*him, \*his, honorable, horizon, imitation, independent, indulgences, \*instead, interesting, \*judgment, knowledge, lavender, level, losing, ma'am, Manila, \*materials, \*minutes,

mountainous, \*necessary, needed, oats, \*of, ones, \*opinion, oxen, parallelogram, peace, peaceful, petit, physical, porous, preference, primly, \*principle, proof, Protestants, \*quite, rectangle, re-enter, retired, scourged, separated, separation, servants, shepherdess, Silas, similarity, skates, succeed, \*suppose, tutors, unfortunately, village, \*which, \*whole, workman. *Total 99.*

A count of the different words in the list gives a total of 233 words misspelled. It should be kept in mind that this list shows only the words that were misspelled three or more times. There were in all, however, 1,925 different words misspelled by the pupils of this high school during the eight months of the study. Evidently, therefore, 1,692 different words were misspelled either once or twice.

There were 28 different words that were misspelled ten or more times. The repeated misspelling of these words totaled 553 errors or 16 percent of all the errors made. There were 62 different words that were misspelled five to nine times inclusive. These were misspelled 400 times. There were 44 words that were misspelled four times, totaling 176 errors; and 99 that were misspelled three times, totaling 297 errors. The total number of errors for words misspelled three or more times was 1,426, or 42 percent of the entire number of errors.

#### PROPER NAMES AND TECHNICAL WORDS

Looking over the list of words misspelled three or more times one finds scattered through it certain proper names and technical words. There were 14 proper names and they contributed 68 misspellings. One does not have a definite criterion for determining technical words, but 17 words were so considered. These yielded 217 errors. Thus proper names and technical words, amounting together to 31 different words, accounted for 285 errors. Recalling that there are only 233 different words in the list, and 1,426 misspellings, one sees that 13 percent of the list and 20 percent of the errors are represented by proper names and technical words. Hence, much of the time devoted to corrective work in high-school spelling in this school should be on technical words and proper names.

#### COMPARISON WITH AYRES' THOUSAND COMMONEST WORDS

Comparing the words in our list with those in Ayres' Thousand Commonest Words one finds that 62 words in the former are in the

latter. These 62 words were misspelled 497 times by the high-school students. There were 1,141 errors made by the high-school pupils in spelling non-technical words (only words misspelled three or more times are reported) and there were 202 such words. Sixty-two (or 31 percent) of the non-technical-error words are found in Ayres' list. These 62 words were misspelled 497 times constituting 44 percent of the errors.

From the viewpoint of curriculum construction these data indicate roughly the relative emphasis to be placed in this school on the commonest words and on the words that are special to the high-school curriculum. That is, approximately 44 percent of the directed spelling curriculum should consist of commonest words such as are found in Ayres' list and the remaining 56 percent should consist of words special to the high-school curriculum.

### CONCLUSIONS

From the standpoint of curriculum construction the word list gives only the needs for the pupils of this high school and similar studies will have to be made before other than a tentative list can be obtained for high schools in general. The technic of investigation is simple and requires only patience on the part of investigators. In fact, the procedure is so simple and straightforward that any high-school faculty can make up a list of words suited to its local needs.

There is no reason to believe that the students in this high school were above the average in spelling, and the study shows that the range of efficiency from the poorest to the best was from 98 to 99.9+ percent. Numerically this is a narrow range, yet so delicate are our sensibilities concerning spelling that it is practically very wide. It includes records of almost every degree of merit to be found in the high school, from the intolerably bad to the altogether satisfactory. A consideration of such facts raises the question of whether the spelling standards set up by society are not arbitrarily and unreasonably high.

# A COMPARATIVE STUDY, BY EDUCATIONAL MEASUREMENTS, OF ONE-ROOM RURAL-SCHOOL CHILDREN AND CITY-SCHOOL CHILDREN

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AND

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## THE NATURE OF THE PROBLEM

A great deal has been written on the relative advantages of rural and city schools. Certain merits of the former have been emphasized in what at times appears to be an attempt to prove that the individual instruction of the ungraded school compensates for the greater proportion of time spent in teaching and the general superiority of instruction in the city school. However great may be the desire to establish the claim that there is equality of opportunity for pupils of both schools, the only proof of it rests upon a careful comparison of the work of typical schools of each group.

For the purposes of this study we have tried to secure typical conditions, and we believe that the results, while strictly true only for the particular groups measured under the conditions of the experiment, give, unless contrary evidence is obtained, some tentative quantitative answers to questions of great educational significance.

## SELECTION OF SUBJECTS

In order to simplify the work only children between the ages of 11 years and 13 years, 11 months were examined. By the time pupils have reached this lower age limit, they have spent about five years in school. During this period differences in the environment of rural and city schools have had time to produce their results.

The upper limiting age was placed at 13 years, 11 months because of the possibly unequal effect of elimination in city and country schools among children beyond that age. It would have been much more advantageous to use age limits one year apart.



It was impossible, however, to secure 50 to 70 children between such narrow limits without increasing enormously the otherwise rather serious traveling factor.

The nature of the selection of each group is as follows:

*The One-Room Rural-School Group*

1. Boys and girls.
2. Age: 11 years, 0 months to 13 years, 11 months.
3. Selected from one-room, one-teacher rural schools in northern Ohio.
4. Examined in groups, varying from two to eight.

*The City-School Group*

1. Boys and girls.
2. Age: 11 years, 0 months to 13 years, 11 months.
3. Selected at random from a city school of average standing, as shown by a recent survey in the city of Cleveland.
4. Examined in a single group.

About fifteen one-room, one-teacher rural schools in northern Ohio were visited. Within each one of these schools every pupil between the ages of 11 years, 0 months and 13 years, 11 months was selected. The possibility that dull children within these age limits might be withheld by the teacher from examination was carefully guarded against. The children of each school were assembled as a group and given the tests under as nearly identical conditions as the changing situations would allow. School after school was visited until 71 pupils had been tested.

One of the large city schools, situated in an average social environment, which had been shown by a recent survey to be of about average standing as compared with the other schools of the city, was chosen to furnish the groups of city-school children. The authors were supplied from the school records with the name of each child whose age fell between 11 years and 13 years, 11 months. These names were then written on small pieces of paper and assembled according to ages. Only 58 of them could be used because the examination room would accommodate no more than that number. From each age-group enough names were drawn at random to make the proportion of children of each age approximately the same in the city and rural groups. The sexes were also equally balanced in the two groups.

It is perhaps well to repeat that no claim is made that either the 71 rural-school children or the 58 city-school children can be taken as typical rural-school children or city-school children

respectively, throughout the country. It is claimed, however, that until similar studies have been made in other places and the results of these studies combined, the present research gives some evidence upon which important decisions may be based.

### PRELIMINARY RECORD CARD

Each pupil, before beginning the test, was asked to fill out an information blank calling for the following data: name, age, grade, school, number of schools attended apart from the present one, nature of school (whether town or village, with name of city or village), and age of entering school. This blank was studied in order to determine the suitability of the child as a member of one or the other group. Children who had spent half-time in rural schools and half-time in city schools were rejected. Those who had spent the last four or five years in one type of school were selected to proceed with the examination.

### NATURE OF TESTS AND METHOD OF ADMINISTRATION

The following is an account of the tests used in the order in which they were given, including, when necessary, comment on the method of administration and scoring

*Cancellation.* Woodworth-Wells sheet. Examples shown on board. Cancel 3's. Time 90 seconds. Basis of scoring, number of correct cancellations.

*Substitution.* Whipple digit-symbol sheet. Examples shown on board. Time 5 minutes. Basis of scoring, number of correct substitutions.

*Addition.* Thorndike sheets. Time 10 minutes. Basis of scoring, number of correct additions.

*Opposites.* A list of forty words taken from Woodworth and Wells. Examples shown on board. Time 90 seconds. Basis of scoring, number of correct opposites written.

*Hard directions.* Woodworth-Wells hard directions test. Similar passage was shown on board. Time 2 minutes. Basis of scoring, one point for each correct response. Where nothing was required to be done, a blank was counted as correct, provided the subject had passed the point.

*Spelling.* Starch spelling list (100 words). Words dictated. Time unlimited. Basis of scoring, number of correct spellings.

*Composition.* Theme on which writing was to be done: "The happiest or most interesting day of my life, where I was and what I did." Time 5 minutes without pencils to think, and then 10 minutes for writing. Basis of scoring, the average grade, on the Hillegas scale, given by twenty undergraduates in the Education Department.

*Handwriting.* The compositions written above, where no mention had been made of handwriting, were graded on the Thorndike scale by twenty undergraduates in the Education Department; the average grade determined the score.

*Information.* A special list<sup>1</sup> of 50 words, selected after experimentation by the authors, to test a wide range of information for children of ages 11 to 13, so chosen as, on the average, not to give undue advantage to either city- or rural-school children. Examples were given on the board and the pupils were told to write a word or sentence to show that they knew what the word meant. No pronouncing of words was allowed. Time 20 minutes. Basis of scoring, one point for each correct response. In all cases where doubt existed as to the correctness of the response, the subject was given the benefit of doubt.

*Courtis Arithmetic, Series A, Fundamentals.* Place for rough work explained. Time 12 minutes. Basis of scoring, one for each correct answer. (The results for part of this test were lost, for which reason no account is given of the work with it.)

In all cases the sheets were distributed face down and the greatest care was taken to see that all the pupils began and finished together. The same examiner conducted the tests on the various groups of rural children as well as on the city group. The same explanation was given to all groups, and the time devoted to explanation was the same.

Owing to the fact that this study was completed in the summer of 1916, some of the tests and methods may appear rather archaic. Were the experiment to be repeated, it is obvious that a reliable group intelligence test combined with a composite school test would be much more advantageous than the tests that were actually applied. At the time when this research was initiated, however, this group of tests—which was being given in another experiment—happened to be ready for use; and it was applied to this problem. The general idea of the selection was to use some

<sup>1</sup> The following words constituted the final list:

quinine	peninsula	submarine	canyon	sleigh
etiquette	luncheon	campaign	million	quotient
missionary	physician	stanza	microbe	ore
politics	Genesis	candidate	jury	settee
percentage	elevator	guitar	abdomen	temperature
Longfellow	census	massacre	patriotism	assembly
dine	quadruped	eclipse	wigwam	Galilee
ammunition	traitor	agitate	Eskimo	ventilation
Shakespeare	avoirdufois	locomotive	corpse	tonsils
prodigal son	glacier	volcano	equinox	tariff

tests, such as *composition* and *addition*, which measure abilities dependent very largely on educational facilities; and to use other tests, such as *substitution*, *cancellation*, *opposites*, etc., success in which would be only indirectly a function of the educational environment.

### PRESENTATION AND INTERPRETATION OF RESULTS

Before attempting to consider the statistical results of the application of these tests, it will be well to raise a question, which underlies the major portion of the interpretation of the data.

Taking the two groups of children, rural and city, to what extent are group differences in achievement due to differences in native intelligence, to differences in home and general out-of-school life, or to differences in school environment? To disentangle these three causes and to assign weights to each is impossible. In the opinion of the authors, what true differences are found must be ascribed chiefly to the third factor. There are probably slight differences in native intelligence, due to the selective influence of the city, etc.; but these differences would certainly not be sufficient to produce the effects shown. Moreover, from internal evidence the tests themselves show that those differences in the two groups which can be assigned to native intelligence and general home conditions are slight. This evidence is obtained by considering the differences in the achievement of the rural and city children in (1) tests which are largely independent of school training, and (2) tests which are largely dependent on school training. Later it will be shown that in the former group of tests there are but slight differences, while in the tests dependent on school training the groups show great differences in achievement.

Whatever opinion there may be as to the causes of differences between the two groups, or as to the weights to be given to native intelligence and environment, this study is justified in that it presents a somewhat detailed comparison of the two groups as they actually existed in a fairly typical state situation. There is no reason to suppose that the rural or city schools in Ohio are much better or worse than those found in large numbers of other states. Even where the state level of education is decidedly better or decidedly worse, it is more than likely that the ratio of

rural-school efficiency to city-school efficiency, upon which this study is based, is fairly constant.

In view of the small number of children in each of the age groups, particularly the thirteen-year-old group, great care must be taken not to press the results beyond the limits which their accuracy permits. While it is true that each individual figure is somewhat unreliable, it is possible to obtain fairly reliable estimates of certain large effects by compounding several results.

Table I shows the distribution by grades of the various age groups. The median grades of the different age groups of rural and city children do not indicate that, as regards the actual grade, whatever that may mean, there is much difference between the rural and city children. Average children of a particular age in the one-room rural schools were about half a grade behind children of the same age in the city school. Seeing that grades mean so little and that the schools are still using the deadening "promotion by age" system, this difference may or may not be significant.

TABLE I. DISTRIBUTION BY GRADE OF THE VARIOUS AGE GROUPS

GRADE	11 YEARS		12 YEARS		13 YEARS	
	Rural	City	Rural	City	Rural	City
I	1	.....	.....	.....	.....	.....
II	.....	.....	.....	.....	.....	.....
III	3	.....	2	.....	1	.....
IV	7	4	5	5	.....	1
V	11	12	7	1	1	1
VI	5	4	10	10	8	2
VII	.....	4	4	3	4	3
VIII	.....	.....	.....	2	2	3
Total.....	27	24	28	21	16	10
Median Grade.	5.2	5.7	6.0	6.5	6.8	7.3

If the grade of pupils were an indication of achievement which was constant from school to school, the study could stop here, the conclusion being that the rural school children are on the average half a grade behind city school children of the same age. There is, however, little equivalence between grade standings within the

same school system, and the equivalence from school to school—particularly among rural schools where teachers change so rapidly—becomes of such small value as to be of no service in interpreting a difference as small as half a grade.

The attainments of the two groups, therefore, are compared for all the tests by statements of (1) the median performance of each age group (rural and city); (2) the median performance of one-room rural-school children translated into percents of the median performance of city-school children of same age; and (3) the percent of one-room rural children of each age equalling or exceeding in performance median city-school children of the same age. These statements constitute Tables II, III, and IV respectively. The reader will observe that in Table III figures in the region of 100 mean that the performances of rural and city children were about the same. Figures less than 100 indicate that the rural children did not do as well as the city children, and figures over 100 indicate that they did better. In Table IV an entry of 50 or thereabouts indicates equality of achievement as between the two groups of children, one of less than 50 that the achievement of rural children was inferior, and one of over 50 that it was superior.

TABLE II. MEDIAN SCORES

TESTS	11 YEARS		12 YEARS		13 YEARS	
	Rural	City	Rural	City	Rural	City
Cancellation.....	42.5	38.6	45.6	42.9	45.0	47.5
Substitution.....	79.3	73.3	78.9	79.3	90.0	76.7
Opposites.....	15.8	15.6	19.1	19.1	23.3	24.0
Spelling.....	60.5	58.3	65.8	68.1	67.5	76.7
Handwriting.....	8.6	10.2	9.1	10.3	10.4	10.3
Information.....	13.1	23.8	20.0	30.8	32.0	32.5
Addition.....	8.7	20.0	11.0	20.5	16.2	22.0
Composition.....	32.5	45.0	41.0	48.5	43.0	52.5
Hard Directions....	6.1	8.0	6.6	10.8	6.8	9.3

A study of Tables II, III, and IV will show that we may assume a practical equality of performance in the following tests: *cancellation*, *substitution*, *opposites*, *spelling*. A distinct superiority of the city-school children, amounting to at least a year, was

TABLE III. PERFORMANCES OF RURAL-SCHOOL CHILDREN AS PERCENTS OF THE PERFORMANCES OF CITY-SCHOOL CHILDREN OF THE SAME AGE

TEST	11 YEARS	12 YEARS	13 YEARS	Average 11, 12, 13
Cancellation.....	110	106	95	104
Substitution.....	108	100	116	108
Opposites.....	101	100	97	99
Spelling.....	104	97	88	96
Handwriting.....	84	88	101	91
Information.....	55	65	98	73
Addition.....	44	53	74	57
Composition.....	72	85	82	80
Hard Directions.....	76	61	73	70

Table reads: In the cancellation test the performance of 11-year-old rural children was 110 percent of that of the city children of the same age; the performance of 12-year-old rural children was 106 percent of that of city children of the same age, etc.

TABLE IV. PERCENT OF RURAL-SCHOOL CHILDREN EQUALLING OR EXCEEDING IN PERFORMANCE MEDIAN CITY-SCHOOL CHILDREN OF THE SAME AGE

TEST	11 YEARS	12 YEARS	13 YEARS	Average 11, 12, 13
Cancellation.....	60	55	50	55
Substitution.....	63	49	63	58
Opposites.....	50	50	44	48
Spelling.....	53	41	29	41
Handwriting.....	23	25	56	35
Information.....	27	20	50	32
Addition.....	11	5	23	13
Composition.....	22	14	9	15
Hard Directions.....	26	10	15	17

Table reads: In the cancellation test, of the 11-year-old rural children 60 percent equalled or surpassed the median city child of the same age; of the 12-year-old rural children 55 percent equalled or surpassed the median city child of the same age; etc.

shown in *writing* and *information*. A very great superiority of the city-school children appeared in the remaining tests: *addition*, *composition*, and *hard directions*. The rural-school children were at least two years to two and one-half years behind the city-school children in these tests.

Assuming as several studies have shown, that spelling ability is largely independent of instruction, the first group of tests may be said to measure power in traits independent of school training. As revealed by tests of this sort, little differences between the attainments of city and rural children were found. According to the second group of tests embracing *writing* and *information*, which are more dependent on instruction, the city-school children were distinctly superior to the rural-school children. In the third group of tests, abilities which, at least as far as *addition* and *composition* are concerned, are almost wholly a product of school training, there was a very large difference in favor of the city-school children. It is difficult to classify the *hard directions* test. While it may appear to be a test of general intelligence and therefore to belong in the first group where equality of attainment is found, from another standpoint it measures the power to perform simple tasks in accordance with directions given—a power in which children who have been trained by superior teaching would naturally be in a better position to score. Moreover, children in graded schools are more accustomed to following oral and written directions without individual explanations than are rural-school children. The latter are more likely to receive personal attention when tasks are allotted or instructions are to be followed. Although it is impossible to substantiate the claim, it appears to the authors that the performance in this test would be largely a function of school training. If this assumption is made, we may conclude for the whole group of tests that the superiority of the city-school children over the one-room rural-school children varied approximately in direct proportion as the demands made by the test called for specific school instruction as opposed to general powers which the school can do little to make or mar.

The poor performance of the rural children in certain of the specific school tests tempted the authors, at the beginning of the study, to assume that the rural children for one reason or another were not willing to cooperate in the experiment. Later, however, when the performances in tests largely independent of school training were determined, the hypothesis had to be abandoned. In all probability, the great differences revealed are general indications of the median powers of the two groups. It would be interesting to investigate the point, upon which this study can throw



no light, as to the true causes of these differences. To what extent was the inferior performance of these rural children—which far exceeded any possible factor of intelligence selection in favor of city-school children—caused by (1) the administrative methods of the school (absence of competition, short hours of instruction, etc.) and by (2) inferior teacher material?

#### VARIABILITY AMONG THE RURAL AND CITY CHILDREN

The absence of large groups prevents detailed treatment of the variabilities of the two groups in each of the tests. It is, however, possible by combining results to get fairly reliable conclusions. The Pearson Coefficient of Variation, using the formula

$$\frac{100\left(\frac{Q_3-Q_1}{2}\right)}{M}$$
 has been worked out for each test for each age group of rural- and city-school children. Averaging these results for substitution, opposites, spelling, and cancellation which are largely independent of school training, the data of Table V result.

TABLE V. COEFFICIENTS OF VARIATION FOR TESTS LARGELY INDEPENDENT OF SCHOOL TRAINING

Age	Rural	City
11	22	17
12	15	14
13	21	16

For the remainder of the tests which are increasingly dependent on school training the corresponding figures are entered in Table VI:

TABLE VI. COEFFICIENTS OF VARIATION FOR TESTS LARGELY INFLUENCED BY SCHOOL TRAINING

Age	Rural	City
11	40	20
12	33	23
13	23	22

From these figures comment may be offered as follows: (1) The rural-school children vary slightly more than the city-school

children in tests independent of school training, and decidedly more in those dependent on school training. (2) In the tests dependent on school work children of both groups show greater variability than they do in the tests independent of schooling. (3) As we pass from the eleven-year-old groups to the thirteen-year-old groups, the variability alters very little among the city children; but there is considerable reduction in the rural-school variability especially in those abilities which depend on school instruction. This suggests that the rural school has not had time until children have reached thirteen years of age to exert the leveling effect which has demonstrated itself by the age of eleven years in the city school.

The results of this study are in accord with some recently published findings of the Virginia Education Commission. In a sampling of the entire school population which was given standardized tests, it was indicated that the one-room rural-school children showed decided deficiency in reading and in handwriting, and that in the use of arithmetical processes they were at least one and one-half grades behind the children of the city schools. In fact, in the summary the Commission suggests that the somewhat low performance of the Virginia school children was due, among other factors, to "the large number of one-room schools."

#### SUMMARY

An unselected group of 71 children from one-room one-teacher rural schools, ages distributed from 11 to 13 years, in northern Ohio, was compared with a similar group of children in an average large city (Cleveland) school by administering nine psychological and educational tests.

In the tests of abilities which are relatively independent of school training—namely, *cancellation*, *substitution*, *opposites*, and *spelling*, there were but small differences in the attainments of the two groups; but in the remainder of the tests—namely *writing*, *information*, *addition*, *hard directions*, and *composition*—the rural children were notably inferior. The inferiority seems to be directly proportional to the extent that the tested function is complex and school-conditioned. In *addition* and *composition* the inferiority was that of two to two and one-half years.

The variability of rural-school children was slightly greater than that of city-school children in tests independent of school training and much greater in tests dependent on school training.

# COMMON SCHOOL FINANCE IN COLORADO AND CERTAIN INFERENCES OF NATIONAL IMPORT\*

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## INTRODUCTION: EXISTING INEQUALITIES OF EDUCATIONAL OPPORTUNITY IN THE UNITED STATES

Throughout the United States, as throughout the world at large, no demand is more insistent, more loudly voiced, more significant today than the demand that education be universalized. It may be startling, but it is nevertheless true, that at the present moment education in the United States is neither universal, democratic, nor free.<sup>1</sup>

In the year 1914-1915 a child living in Massachusetts would probably have attended school 157 days during the year, would have been taught by a teacher receiving an annual salary of over \$800, and would have had \$53 expended upon his education.<sup>2</sup> If, on the other hand, he were living in Alabama, and if he were fortunate enough to belong to the 63 percent of the children enrolled in school, he probably would have attended school 79 days, would have been taught by a teacher receiving an annual salary of \$345, and during the year would have had \$16.06 expended upon his education.

In Alabama the average length of the school year in rural communities is 110 days, in urban communities 176 days; 50 percent of the white children attend school, and only 29 percent of the negro children. There is on the average in this state one teacher for every 53 white children, but only one for every 130 negro children.<sup>3</sup> In Colorado, the state in which the chief interest of the present article lies, first- and second-class districts pay on

\* The present study will constitute one of a series in a forthcoming monograph entitled, *Studies in public school finance in the United States*.

<sup>1</sup> That the schools of Alabama for example are not free is shown by the fact that in an appreciable portion of the districts, revenue is derived from fees required of students and from the gifts of patrons. In the year 1916-1917, \$484,054 was derived from these sources. See *Alabama department of education annual report*, 1917, p. 133.

<sup>2</sup> *United States commissioner of education report*, 1917, 2:45, 48, 50, 55.

<sup>3</sup> *Alabama department of education annual report*, 1917, pp. 23-26.

the average from two to four times as high a rate of school tax as do third-class districts.<sup>4</sup>

At no time in the history of our republic has there been a wider realization that education is not, but must be, universalized and democratized; and that such democratization involves at least two processes: (1) reorganization of our course of study, educational institutions and systems, including political school units; and (2) the distribution of vastly increased expenditures for schools in accordance with scientific methods.

### THE EDUCATIONAL SITUATION IN COLORADO

Colorado ranked (in the year 1918) nineteenth in the Union with respect to total valuation, eleventh in annual school expenditure per capita of average attendance, twelfth in average annual salary of teachers, and tenth in percent of children of school age enrolled in school. As one of the last states to be admitted into the Union,<sup>5</sup> she had the opportunity of profiting by the experience of the older states. The sixteenth and thirty-sixth section lands granted her upon admission to the Union for the use of the common schools totaled approximately 3,712,307 acres,<sup>6</sup> an area greater than that of the entire state of Connecticut. Whereas many of the states early disposed of their school lands, Colorado realized from the very beginning the folly of such a policy and today still retains the greater part of her school-land empire. Before entering upon a study of Colorado's system of common school support, it will be well to endeavor to gain some conception of her general educational situation. This can be most easily and quickly done by presenting tabularly certain significant data. Table I, which follows, attempts to show:

1. The conditions with which the school system has to deal.
2. The financial support given by the state to the efforts of the schools.
3. The results of the interaction of 1 and 2, as seen in enrollment, attendance, length of school year, illiteracy, and teachers' average wage.

*Defects, attendance and enrollment.*—Table I shows us that whereas in 1918 Colorado ranked eleventh in annual expenditure

<sup>4</sup> SARGENT, C. G. *Rural and village schools of Colorado*, pp. 47, 63.

<sup>5</sup> Admitted in 1876. Only ten states were admitted later, namely: (1) North Dakota, (2) South Dakota, (3) Montana, (4) Washington, (5) Idaho, (6) Wyoming, (7) Utah, (8) Oklahoma, (9) Arizona, (10) New Mexico.

<sup>6</sup> *Colorado state land commissioners' report, 1917-1918*, p. 86.

TABLE I. FACTORS IN THE EDUCATIONAL SITUATION OF COLORADO IN 1918<sup>a</sup>

A. CONDITIONS	Size of Item	Rank in Union(b)
I. TOTAL GROSS AREA(c).....sq.mi.	103,948	7
II. POPULATION		
1. Density(d) (1910), Popula'n per sq. mi.	7.7	40
2. Total(e) (U. S. Census estimate).....	1,014,581	32
3. Percent white(f) (1910).....	98.0	16
4. Percent negro(f) (1910).....	1.4	28.5
5. Percent foreign born white(f) (1910).....	15.9	21
6. Percent rural(g) (1910).....	49.3	35
7. Percent urban(g) (1910).....	50.7	15
8. School population (est. 5-18 yrs.)(h).....	237,407.0	33
9. Percent of population over 10 years of age which is illiterate(i) (1910).....	3.7	17.5
III. ESTIMATED TRUE VALUE OF ALL PROPERTY OF STATE (1912)		
1. Total(j).....	\$2,386,923,583.0	19
2. Taxable(j).....	\$2,286,478,777.0	20
B. SUPPORT		
I. ANNUAL CURRENT EXPENDITURES FOR PUBLIC SCHOOLS		
1. Total(k).....	\$8,093,598.0	22
2. Per capita of average attendance(l).....	\$58.65	11
II. TOTAL EXPENDITURE FOR SCHOOLS ON EACH \$100 OF ESTIMATED TAXABLE WEALTH(j) (1912).....	\$0.285	23
III. PERCENT TOTAL LEVY FOR SCHOOLS IS OF TOTAL TAXATION FOR ALL PURPOSES(m) (1912).....	38.84	8
C. RESULTS		
I. NUMBER OF CHILDREN OF ALL AGES ENROLLED(n).....	200,763.0	32
II. PERCENT OF CHILDREN OF SCHOOL AGE (5-18 YEARS) ENROLLED(o).....	84.6	10
III. PERCENT OF CHILDREN ENROLLED IN DAILY ATTENDANCE(p).....	68.7	35
IV. AVERAGE LENGTH OF SCHOOL YEAR IN DAYS(q).....	168.0	23.5
V. AVERAGE ANNUAL SALARY OF ALL TEACHERS(r).....	\$749.0	12

<sup>a</sup> All data are for 1917-1918 unless otherwise specified, and are taken from federal reports which, though far from accurate, are nevertheless the only source available for interstate comparisons and rankings. Dated items are latest available.

<sup>b</sup> Computed from data on page referred to.

<sup>c</sup> Thirteenth census of the United States, 1910. Abstract with supplement for Illinois, p. 28, table 9.

<sup>d</sup> Ibid., p. 29, table 11.

<sup>e</sup> Statistics of state school systems, 1917-1918, p. 93, table 20.

<sup>f</sup> Thirteenth census of the United States, 1910. Abstract with supplement for Illinois, p. 86, table 14.

<sup>g</sup> Ibid., p. 56, table 18.

<sup>h</sup> School population estimated by the federal commissioner, on the basis of 5-18 years. The legal school age of Colorado is 6 to 21 years.

<sup>i</sup> Statistics of state school systems, 1917-1918, p. 95, table 22.

<sup>j</sup> Ibid., p. 153, table 60.

<sup>k</sup> Ibid., pp. 144-5, table 55.

<sup>l</sup> Ibid., pp. 148-9, table 57.

<sup>m</sup> Ibid., pp. 150-1, table 58.

<sup>n</sup> Ibid., p. 99, table 25.

<sup>o</sup> Ibid., p. 94, table 21.

<sup>p</sup> Ibid., pp. 108-9, table 36, column 15.

<sup>q</sup> Ibid., pp. 108-9, table 36, column 11.

<sup>r</sup> Ibid., p. 114, table 39. Includes salaries of superintendents, supervisors, and principals.

per capita of average attendance, she ranked thirty-fifth with respect to the percent of children enrolled who were in daily attendance. As a result of a careful study of the 1,725 rural districts included within the state, Sargent discovered that an average of 22 percent did not enroll each year.<sup>7</sup> Moreover, the average percent of the census enrolled varied all the way from 93 in Sedgwick County to 59 in Baca County, "while between the different districts within the same county the eight-year average varies from as low as 30 percent of the census to even more than 100 percent of the same."<sup>8</sup> Conditions with respect to the average daily attendance are even more unsatisfactory. Sargent continues:

The average daily attendance of those who did enroll, and thus came under the influence of the school, makes a far worse showing. The county at the bottom of the list had an average daily attendance of but 51 percent of the enrollment for the eight-year period, while the one at the top of the table had an average of 77 percent. The eight-year average for the sixty counties and 1,725 third-class districts was but 61 percent of the enrollment. This means that on the average 39 children out of each 100 enrolled were out of school each day.<sup>9</sup>

It might seem that the explanation of the above incomplete enrollment and irregular attendance lies in the topography of the state, in its low density of population, or in the large percent (49.3) of its population which is rural. Such explanations are untenable in the light of Sargent's study. He writes, "The great majority of the school children in Colorado's rural schools live in districts and attend schools where there is a sufficient number of children to make very efficient schools." Again, in a concluding paragraph, Sargent states that the topography of the state is not a serious obstacle in the way of effective school systems:

The great majority of the country children in this state live under conditions that are favorable for good schools and if all these would consolidate where consolidation is easily possible and feasible, these localities would make much more progress in school improvement in a single year than they have from the time the districts were established up to the present time.

<sup>7</sup> SARGENT, C. G. *Rural and village schools of Colorado*, p. 13.

<sup>8</sup> This seemingly strange condition (i.e., enrolling more than 100 per cent of the school census) is made possible because of the fact that after February 10, the date the school census is taken, no further census record is made of children who move into the district. Consequently, if a sufficient number of children move into a district after February 10, and attend school, it is possible that the school enrollment will exceed the school census.

<sup>9</sup> SARGENT, C. G. *Rural and village schools of Colorado*, condensed from p. 20, omissions not indicated.

Reserving for concluding paragraphs further discussion of educational inequalities, we may now turn to the questions in which our chief interest lies: (1) from what sources Colorado derives her moneys for public schools; (2) how these moneys are disbursed; (3) to what objects they may be lawfully applied; (4) the chief merits, defects, and desirable modifications of the present system of school support.

In order to compare conditions in Colorado with those in other states, it was necessary to select some year for which it was possible to secure data for a large number of commonwealths. At the time the present study was begun, the most recent comparative data available for all states were those for the years 1915-1916 contained in volume 2 of the 1917 report of the commissioner of education. The data presented by Monahan and Cook, which were of inestimable value but which could not be reproduced, were for 1915. For these as well as for a number of other reasons 1915 was the year selected for making comparisons. Shortly after the present study had been completed, not only were the 1918 data for all states made available by the Bureau of Education, but the 1919 education laws of Colorado were published. It seemed advisable, therefore, to revise the present account in order to present as far as possible conditions in 1918. In many cases, however, this was impossible, and in others the gain would have been too slight to warrant the work involved in such revision.

It may not be amiss to note at this point a few of the difficulties which have been encountered. The information given in the United States commissioner's reports is in many cases unreliable, as will be seen from the fact that the commissioner has for a number of years regularly reported certain Colorado school moneys as derived from "state tax or appropriations."<sup>10</sup> The truth is that no moneys whatsoever are derived from a state school tax nor have moneys been derived, prior to the acceptance of the Smith-Hughes Act, from regular annual appropriations. The term, "general fund by apportionment," is used in Colorado reports to designate the total quota of current school revenue distributed to school districts. It is derived from state funds, county funds, and that portion of the national forest reserve fund which is used for schools. There is no way of ascertaining what share of the

<sup>10</sup> *United States commissioner of education report*, §1917, 2:51.

moneys is derived from state and what share from county sources. No state record appears to be kept of the quota of the national forest reserve fund income devoted by counties to schools. The above difficulties are typical of the many which have been met. They explain the incompleteness of the present account at certain points.

*School units in Colorado.*—The state of Colorado is divided into 63 counties, which in turn are divided into first-, second-, and third-class school districts and three classes of high-school districts. In 1915 the total number of school districts was 2,019, as follows:

SCHOOL DISTRICTS		HIGH SCHOOLS	
First class.....	31	District.....	121
Second class.....	59	Union.....	29
Third class.....	1758	County.....	21
	<hr/>		<hr/>
	1848		171
Total.....			2019

The sources from which Colorado derives her moneys for common schools fall into four classes, namely: federal, state, county, and district.

#### FEDERAL AID

*National forest reserve fund.*—Chapter 192 of the Acts of Congress (May 23, 1908) provided that thereafter 25 percent of all moneys received from each forest reserve during any fiscal year, including the year ending June 30, 1908, was to be paid at the end thereof to the state or territory in which said reserve is situated, to be expended as the state or territorial legislature may prescribe for the benefit of the public schools and the public roads of the county or counties in which the forest reserve is situated.

The state of Colorado received from the national forest reserve fund, from leases of forest reserve lands and the sale of lumber, for the school year 1915-1916, \$63,995.00. This was distributed to 42 counties in which the reserves were situated and it was used by the counties for schools and roads, the amount for each purpose, above a minimum of 5 percent, being determined by the county commissioners.<sup>11</sup>

<sup>11</sup> *Report of the Colorado school system*, p. 33. Monahan's table shows the amount received by each county. The total receipts for the biennium 1916-1918 (i.e., for the years 1917 and 1918) were \$165,698.75. The same was disbursed *in toto*. (*Colorado state treasurer's report*, 1916-1918, p. 8.) The average annual sum, therefore, was \$82,849.37½.



As already noted, no state record is available of the quotas of national forest reserve fund income devoted by the state to school or other objects of expenditure.

*Federal fines.*—The federal criminal code provides that all fines collected for injuring by fire the public domain, i.e., United States government lands, shall be paid into the public school fund of the county in which the lands are situated. These fines, though collected in the county and turned into the county school fund, are levied under the federal law for infringement upon federal property. They must, therefore, be regarded as federal moneys devoted to common schools.<sup>12</sup>

*Smith-Hughes grant.*—The Smith-Hughes bill, providing federal aid to the states for vocational education, was accepted by Colorado by an act approved April 10, 1917. Many standards and conditions must be met in order to receive such federal aid. The one requirement which bears directly upon the subject of school finance is that the states must match dollar for dollar the federal grant.

The Colorado legislature of 1919 provided for a permanent annual appropriation of \$10,000 for administering and supervising the Smith-Hughes work and appropriated the following sums for the years indicated to match the federal grants:<sup>13</sup> 1919, \$27,560; 1920, \$31,950; 1921, \$36,340; 1922, \$40,730; 1923, \$45,120; 1924, \$53,900; 1925, and annually thereafter, \$62,680.

Table II shows the total (federal and state) moneys spent on vocational education, and the unexpended balance of Smith-Hughes moneys:

TABLE II. SMITH-HUGHES FUND FOR VOCATIONAL EDUCATION, 1917-1918<sup>a</sup>

Federal moneys expended for:	
Vocational agriculture.....	\$ 3,737.50
Trade, industry, and home economics.....	3,333.34
Teacher training.....	4,000.00
Total federal grants.....	11,070.84
Moneys appropriated by state.....	11,070.84
Total expended for vocational education.....	22,141.68
Smith-Hughes federal moneys unexpended.....	3,929.16 <sup>(b)</sup>

<sup>a</sup> *Second annual report of the federal board for vocational education*, pp. 110-12.

<sup>b</sup> Computed from figures given in *ibid.*

<sup>12</sup> *Federal criminal code*, secs. 52-54. *Colorado school laws, annotated*, 1917, p. 99, secs. 168, 169; p. 100, sec. 170.

<sup>13</sup> *Colorado educational laws*, 1919, pp. 37, 38.

## STATE AID

*The public school fund.*—Colorado levies no state tax for common schools and prior to the acceptance of the Smith-Hughes grant had pursued no policy of providing either general or special appropriations.<sup>14</sup> The United States commissioner's report erroneously states that in the year 1914–1915, Colorado received for the common schools \$1,953,008 derived from "state tax or appropriations."<sup>15</sup> This sum was in reality the "general fund by apportionment" as reported for the year 1914.<sup>16</sup> The only educational tax levied in Colorado is a state tax of two-fifths of one mill levied for the support of the state university. The sole state source, prior to 1917, aside from the proceeds of certain state fines from which common school revenues were derived, was the permanent common school fund, officially known as the public school fund.<sup>17</sup>

The following statement shows the condition of the public school fund (cents omitted) as reported on November 30, 1916.

Invested cash, principal. . . . .	\$3,777,154	
Certificates of purchase (representing deferred payments and drawing 6% and 7% interest). . . . .	3,498,925	\$7,276,079
3,037,358 acres unsold school land, estimated value. . . . .	45,560,367	
Estimated value of 250 acres of mineral land. . . . .	50,000,000	95,560,367
		<hr/>
		\$102,836,446 <sup>18</sup>

*Value of unsold school land.*—Any valuation assigned to the three million acres of unsold school land belonging to the public school fund is to be regarded as entirely hypothetical. Three and

<sup>14</sup> In addition to the moneys required to match the Smith-Hughes grant, the legislature of 1919 appropriated \$4,000 for a child welfare bureau and \$200,000 as a state educational loan fund for disabled sailors and soldiers (*Colorado educational laws*, 1919, p. 18, sec. 5; p. 32, sec. 3). Although these may be regarded as educational appropriations, neither is for common schools. The \$150,000 "appropriated" for equalizing teachers' salaries, as explained below (p. 752), is not in any real sense an appropriation but rather a transfer from the income of the public school fund.

<sup>15</sup> *United States commissioner of education report*, 1917, 2:51.

<sup>16</sup> *Twenty-first biennial report of the state superintendent of public instruction*, 1916, p. 39.

<sup>17</sup> Constitution, art. ix, sec. 5. Several other titles are used in official reports and in the laws, e.g., permanent school fund, state school fund, public school land permanent fund. It is unnecessary to state that the correct title is that provided by the constitution. For an account of the origin of this fund, see F. H. Swift's, *A history of public permanent common school fund in the United States, 1795–1905*, chapters 3 and 13.

<sup>18</sup> *Colorado state land commissioners' report*, 1915–1916, pp. 3–4. This is the only statement I have found anywhere which includes certificates of purchase.

a half dollars per acre is the minimum price fixed by law.<sup>19</sup> This minimum has had apparently very little influence upon the actual sale price. The average sale price from 1907 to 1914 inclusive was approximately \$10.50 per acre. During the biennium 1915-1916, the average price per acre was \$11.15 and during 1917-1918, \$14.37. The \$45,000,000 valuation stated above refers to the surface valuation only. To this it is necessary to add a considerable sum to represent the prospective returns from mineral products existing in school lands. In 1916 the state land register's office wrote: "The state has nearly 3,300,000 acres of land left, worth some \$350,000,000; approximately 500,000 acres being underlaid with coal, which is estimated by the superintendent of the mineral division to be worth \$200 per acre, or \$100,000,000 making an estate to be handled reasonably worth \$125,000,000."<sup>20</sup>

*Sources of increase.*—The following sources are provided for increasing the principal of the public school fund:<sup>21</sup> (1) the proceeds from all common school lands granted to the state by the federal government for educational purposes; (2) all estates that escheat to the state; (3) all other grants; (4) gifts; (5) devises made to the state for educational purposes; (6) all rentals and royalties received by the state as rentals and royalties from stone, coal, oil, gas, gold, silver or other mineral lands belonging to the public school fund; (7) fines imposed upon county officers for neglect of land act duties. It is scarcely necessary to state that

TABLE III. PUBLIC SCHOOL FUND LAND SALES, 1907-1914<sup>a</sup>

Biennial Term(b)	Acreage Sold	Total Purchase Price	Average Price per Acre
1907-1908	60,356.25	\$ 521,627.04	\$ 8.31
1909-1910	287,340.63	3,331,591.59	11.59
1911-1912	79,639.33	826,268.17	10.38
1913-1914	91,215.57	762,375.80	7.35
Total	518,551.78	\$5,441,862.60	\$10.50 (avg.)

<sup>a</sup> All data in this table are taken from the *Colorado state land commissioners' report*, 1913-14, p. 5.

<sup>b</sup> As already noted, many of the Colorado reports give biennial but not annual data.

<sup>19</sup> *Colorado state land laws*, 1914, p. 49, sec. 133; *ibid.*, 1917, p. 9, sec. 16.

<sup>20</sup> *Colorado state land commissioners' report*, 1913-14, p. 5; 1915-16, p. 3; 1917-18, p. 3.

<sup>21</sup> Constitution, art. ix, sec. 5; *Colorado school laws, annotated*, 1917, p. 105, sec. 183; p. 106, sec. 187; *Colorado session laws*, 1914, p. 46; *Colorado land laws*, 1914, p. 62, sec. 162; p. 46, sec. 127.

the largest increment of the public school fund has been derived from the proceeds of the sale of school lands. Table III shows the acreage of the school lands sold 1907-1914 inclusive, the net proceeds, and the average price per acre.

The moneys thus far added to the public school fund from the proceeds of escheats appear to be negligible. The only record I have found of any additions from this source is \$7,888.56, added during the biennium ending December 1, 1914.<sup>22</sup> The proceeds of unclaimed estates are set aside and kept as a separate account known as the escheats fund. The moneys belonging to this fund are held by the state for 21 years awaiting possible claimants. At the end of the 21 years the estate may escheat to the state, and the proceeds be added to the public school fund.

*Growth of public school fund.*—The proceeds of fines (from \$5. to \$500) imposed upon county officers for neglecting to perform any duty required by the provisions of the State Land Act are added to the permanent public school fund.

Table IV shows the biennial growth of the principal and income from 1903 to 1918 inclusive and the average annual increase of the latter.

TABLE IV. GROWTH OF PUBLIC SCHOOL FUND, 1903-1918<sup>a</sup>

Biennium	Balance in Treasury at Opening of Biennium <sup>(b)</sup>	Amount Added During Biennium <sup>(c)</sup>	Average Annual Increase (Computed)
1903-1904	\$1,254,716.73	\$ 129,612.84	\$ 64,806.42
1905-1906	1,384,329.57	48,729.67	24,364.83
1907-1908	1,433,059.24	168,847.93	84,423.96
1909-1910	1,601,907.17	446,385.43	223,197.71
1911-1912	2,048,292.60	579,120.59	289,197.71
1913-1914	2,627,413.19	431,106.37	215,553.18
1915-1916	3,058,519.56	718,634.62	359,317.31
1917-1918	3,777,154.18	1,171,338.05	586,669.02

<sup>a</sup> All data taken from reports of Colorado state treasurer for biennium referred to.

<sup>b</sup> Certificates of purchase apparently not included.

<sup>c</sup> Does not include total receipts as small sums were disbursed. See reports of the Colorado state treasurer as here cited.

*Management of public school fund.*—The management of the public school fund is divided between the state board of land commissioners and the state treasurer. The state board of land commissioners is composed of a president, a register, and an

<sup>22</sup> *Colorado state treasurer's report*, 1913-1914, p. 5.

engineer<sup>23</sup> whose salaries are fixed by law at \$3,000 per annum. The state treasurer is the custodian of the fund. To protect public moneys against misuse or manipulation for the sake of private gain, the laws declare making profits on the same to be a public felony.<sup>24</sup> All interest on the purchase money and all money derived from rents and leases for the occupation and use of the surface of school lands are paid by the register to the state treasurer, who credits the same to the income of the public school fund. This current fund is known as the public school land income fund.

*Investment losses.*—Colorado, like many other states, has experienced great difficulty in finding proper securities in which to invest school funds. The aim of those framing the laws and prescribing legal securities seems to have been to guarantee that bonds and warrants issued by the state might be sure of a purchaser, namely, the public school fund. Prior to 1919, neither the bonds of the United States nor the bonds of other states were included in Colorado's list of lawful investments for school fund moneys.<sup>25</sup> Large funds pouring into the state treasury, subject to investment, and an extremely limited range of securities in which such funds could be lawfully invested, could have but one result, namely, large sums on hand for which no lawful investments could be secured. Various laws have been passed designed to remedy this situation.

In 1905 a law was passed known as the State Land Loan Act, one purpose of which was to extend the range of the lawful investments of state funds. Section 37 provided that all state funds raised from the sale or rent of state lands, unless otherwise disposed of by law, shall be invested: (1) in bonds of the state of Colorado; (2) in interest-bearing warrants of the state of Colorado; (3) in irrigation district bonds; (4) in 6 percent loans of \$1,000 or less, or if possible, of \$500 or less, on unincumbered real estate for a period of from one to five years.<sup>26</sup>

This law accomplished little. Moreover, the constitutionality of the investments in real estate loans was seriously questioned. In 1916, by a referendum vote of the people, a bill known as the

<sup>23</sup> *Colorado state land laws*, 1914, p. 41, sec. 115; p. 57, sec. 151; *Colorado school laws, annotated*, 1917, p. 105, sec. 182; Constitution, art. IX, sec. 3.

<sup>24</sup> Constitution, art. x, sec. 13; *Colorado school laws, annotated*, 1917, p. 105, sec. 184.

<sup>25</sup> In 1918 the state invested \$100,000 in Liberty Loan Bonds. See below, page 659.

<sup>26</sup> *Colorado session laws*, 1905, p. 334-35, chap. 134, sec. 37; *Colorado revised statutes*, 1908, pp. 1223-24, sec. 5198; *Colorado state land laws*, 1914, p. 57, sec. 151.

Farm Land Loan Bill was passed. This bill provided that, "All school funds of the state, whether permanent or income, unless otherwise disposed of by law, shall be invested as directed by the state board of land commissioners" in the following securities:<sup>27</sup> (1) interest-bearing warrants of the state of Colorado; (2) bonds of the state of Colorado; (3) farm loans; (4) Colorado school district bonds; (5) Colorado county, city, or town bonds approved by the attorney general and the state board of land commissioners. The investment of public school funds in farm mortgages was subsequently declared unconstitutional.

As a result of the failure to provide proper and sufficient securities for the investment of state funds and the consequent large sums remaining uninvested from year to year, the educational fund in Colorado has been deprived annually of large portions of the revenue which it should have earned. Not only is this true, but the harmony which should exist between the state treasurer (the custodian of the fund) and board of land commissioners, for the best handling of the fund could not be maintained. The land commissioners continued to urge that the funds be invested in accordance with the provisions of the State Land Loan Act passed in 1905, while the state treasurers, in defiance of the land commissioners' authority, who are empowered by law to direct the investment of these funds, successively refused to invest the funds in securities other than state warrants and state bonds. Such refusal resulted in a large uninvested surplus. This, in defiance of the state land commissioners, if not of the law, was deposited in various banks scattered throughout the state.

The auditor reports that between January, 1901 and 1911 the income of the fund was deprived of \$24,408.90 by shortages in the state treasury. From the following statement of investment of the public school fund,<sup>28</sup> it will be seen that in 1916 one-fourth of the principal of the fund was deposited in banks:

State Warrants.....	\$ 433,919.24
Insurrection Bonds, 1909.....	659,544.05
Funding Bonds, 1910.....	1,696,263.08
Insurrection Bonds, 1914.....	438,700.00
Deposited in Banks.....	<u>1,149,627.81</u>
Total.....	\$4,378,054.18

<sup>27</sup> *Colorado state land commissioners' report*, 1915-1916, pp. 7-11.

<sup>28</sup> *Colorado state treasurer's report*, 1915-1916, p. 8.

Such a condition emphasized the necessity of providing new avenues of investment. In 1917-1918 the Farm Land Loan Act was put into operation, and in 1919 the legislature passed an act providing for the investment of moneys belonging to the public school investment funds in United States bonds.<sup>29</sup> The following statement shows the investments in 1918:<sup>30</sup>

U. S. (Liberty Loan) Bonds.....	\$ 100,000.00
State Bonds.....	2,721,047.00
State Warrants.....	412,561.13
County and Municipal Bonds.....	869,367.88
School District Bonds.....	363,050.50
Farm Loans.....	66,300.00
Cash on hand Nov. 30, 1918.....	416,165.72
Total.....	<hr/> \$4,948,492.23

*State fines, general school fund.*—The proceeds of penalties for at least two classes of state offenses covered into the state treasury are added to the general school fund of the state:<sup>31</sup> (1) fines (\$25 to \$300) for violations of the provisions of mining laws or the rules of the state commissioner of mines; (2) "forfeiture for failure to publish and distribute official state reports required by law to the members of the legislature on the date fixed by law."

### COUNTY AID

Colorado possesses no local public permanent common school funds, either county or district. The terms, "general school fund" and "county school fund," are employed in the laws to denote the sum total of school moneys received into the county treasury. This includes six classes of current funds: (1) quotas from the national forest reserve fund (42 counties); (2) quotas from the income of the public school fund; (3) moneys derived from the general county school tax; (4) special taxes for county high schools and for district high schools located at the county seat; (5) proceeds of the sales of lost articles and estrays; (6) proceeds of fines. Preceding paragraphs have shown that of the above six classes of funds (1) and (2) are federal and state funds respectively. The only relation which the county has to them is that it serves as an agency for disbursing them to the

<sup>29</sup> *Colorado educational laws*, 1919, p. 10.

<sup>30</sup> *Colorado state land commissioners' report*, 1917-1918, p. 16.

<sup>31</sup> *Colorado revised statutes*, 1908, p. 1078, sec. 4305; p. 1136, sec. 4710; p. 1226, sec. 5209; *Colorado state land laws*, 1914, p. 67, sec. 162.

districts. Our present discussion, therefore, will be confined to the last four of the six classes of funds just named.

*General county school tax.*—The laws of Colorado require that all taxable property be listed, valued, and assessed at its full cash value. Each county is required to levy annually a general county school tax of not less than ten mills. In Colorado the county is a school unit only in a subordinate sense. The purpose of the county general school tax is to furnish money for the districts—sufficient to enable each to maintain a public school six months in each year.<sup>32</sup> The amount of money needed to maintain the schools the minimum term must be determined and certified in advance by the county superintendent to the board of county commissioners, whose duty it is to levy the general county school tax. In making the estimate, the county superintendent shall use as a basis the sum of sixty dollars per month for each teacher employed in third-class districts and seventy-five dollars per month for each teacher employed in first- and second-class districts. Districts whose school population, as shown by the school census preceding the time of making the levy, was less than fifteen shall not be included in the estimate. The money raised by general county school tax shall be used for teachers' wages only. All other expenses<sup>33</sup> of the school districts must be provided for by a special district tax.

*County high-school four-mill tax.*—In addition to the general county school tax, a special high-school county tax, not to exceed four mills, may be levied to furnish current support for a county high school. There are three classes of high schools in Colorado: (1) district high schools; (2) county high schools; (3) union high schools.<sup>34</sup>

District high schools may be maintained in any first- or second-class, but not in a third-class (rural) district. District high schools are supported (a) by their quotas from the general fund and (b) by a special district tax. County high schools, unless

<sup>32</sup> *Colorado educational laws*, 1919, pp. 34–35, sec. 1. Prior to 1919 the maximum tax had been five mills and the minimum school year four months. See *Colorado school laws, annotated*, 1917, pp. 161–62, 168.

<sup>33</sup> This statement taken directly from the laws is, of course, inaccurate, as many expenses are provided by state funds.

<sup>34</sup> *Colorado school laws, annotated*, 1917, p. 142, sec. 281, note. This note defines the different kinds of public schools in Colorado, and summarizes their sources of revenue. The data in the present section, unless otherwise indicated, are taken from this note.



otherwise voted by a majority of the electors of the entire county, are established at the county seat. They are free to all children within the county. They are supported (a) by their quotas from the general fund and (b) by a special county high-school tax not to exceed four mills upon all taxable property within the county. Union high schools are high schools maintained for a district formed by the union of two or more districts. Union high-school districts are of three kinds: (1) districts "composed of two or more contiguous districts, not including a county seat or an incorporated city or town in a fourth- or fifth-class county"; (2) districts composed of districts contiguous to and including an incorporated city or town in fourth- or fifth-class counties; (3) districts in which the county seat is all included in one district.

Our interest in union high-school districts is limited to those of the above third class, as they alone are supported (a) by their quotas from the general fund and (b) by a levy of not less than one nor more than four mills on all taxable property of the county. In 1919 a law was passed whereby any consolidated school district maintaining an accredited high school and any school district organized into a union high-school district and maintaining therein an accredited high school may, by a majority vote of its electors, be exempt from payment of county high-school taxes.<sup>35</sup>

*County high-school bonds and bond tax.*—Counties maintaining county high schools and which are, therefore, in themselves high-school districts are empowered to issue bonds for the purpose of raising money to erect and furnish high-school buildings, to purchase grounds, or to fund floating debts, provided that: "in no case shall the aggregate amount of bonded indebtedness of any high-school district for high-school purposes exceed two percent of the assessed value of the property of such high-school district."<sup>36</sup> The county commissioners are required to levy and assess a special tax on all taxable property of such county-high-school districts sufficient: (1) to pay the interests on such bonds; (2) to provide for the redemption of the same at maturity.<sup>37</sup>

*Estrays, fines, and forfeitures.*—"All funds arising from the sale of lost goods and estrays shall be paid . . . to the county treasurer of the county in which the same have accrued, and shall

<sup>35</sup> *Colorado educational laws*, 1919, p. 34.

<sup>36</sup> *Ibid.*, p. 19, sec. 40.

<sup>37</sup> *Ibid.*, pp. 20-21, sec. 42.

be by him credited to the general county school fund."<sup>38</sup> The proceeds of not less than 21 classes of county fines and forfeitures are devoted to the general county school fund by law.<sup>39</sup>

### DISTRICT AID

*Importance of the school district.*—It is no exaggeration to say that in Colorado the school district is the determiner of the school situation. The district board not only has charge of the school property and employs the teachers, but it adopts the course of study, selects the textbooks, and fixes the length of the school term above the minimum required by law.<sup>40</sup> In matters of school finance the district is equally important and supreme. Its economic importance is shown by the fact that by far the largest quota of school revenue comes from the special district school tax—in 1914–1915, 71 percent.<sup>41</sup> Furthermore, all school revenues, federal, state, and county, are brought into one fund, the general fund by apportionment, and then turned over to the districts to be used by them for any lawful object in any proportion the district determines, provided only that a school be maintained the minimum school year and that every teacher employed be paid at least the minimum wage per month.

*District sources of school moneys.*—The common school moneys furnished by the district are derived from the following sources:<sup>42</sup>

1. District school taxes (a) "special school tax" required<sup>43</sup> of all districts (limit in third-class districts, 20 mills);<sup>44</sup> (b) special district school bond tax;<sup>45</sup> (c) special district high-school tax;<sup>46</sup> (d) teachers' retirement fund tax (in first-class districts only) not to exceed one-fifth of one mill<sup>47</sup>

<sup>38</sup> *Colorado school laws, annotated*, 1917, p. 110, sec. 201. For details compare *Colorado revised statutes*, 1900, p. 1479, sec. 6369; p. 1606, sec. 6895.

<sup>39</sup> It has been necessary to omit a table compiled from an exhaustive study of the revised statutes, presenting these 21 offenses and the corresponding penalties.

<sup>40</sup> *Colorado school laws, annotated*, 1917, pp. 68–71, sec. 134.

<sup>41</sup> *Report of the Colorado school system*, p. 34. Table VI shows that according to the data given in the state superintendent's report only 53.6 percent was derived from special district tax.

<sup>42</sup> It must be borne in mind that we are dealing here with the sources which the districts provide, not with all the sources from which they receive funds. This explains why no mention is made in the present section of the public school emergency fund, or the minimum wage for teachers fund. These funds are, as will appear later merely quotas of the income of the public school fund. They will be discussed in connection with the topic "Disbursement of the public school fund."

<sup>43</sup> *Colorado school laws, annotated*, 1917, p. 162, sec. 331.

<sup>44</sup> *Ibid.*, p. 165, sec. 336.

<sup>45</sup> *Ibid.*, p. 9, sec. 14; pp. 11–12, secs. 21, 23.

<sup>46</sup> *Ibid.*, p. 142, sec. 281, note.

<sup>47</sup> *Colorado educational laws*, 1919, p. 33, sec. 4.

2. District bonds<sup>45</sup>3. Fines<sup>48</sup>

*Special school tax and uses.*—"Special school tax" is the term definitely provided by law to designate the tax levied by all school districts.<sup>49</sup> This tax is required of all districts. "If any school district shall fail to certify a special tax for other expenses (than teachers' wages) necessary to maintain a public school each year . . . the county commissioners shall cause the same to be levied."<sup>50</sup>

As already noted, the county is required to furnish by a county school tax not to exceed ten mills sufficient funds to enable each school district within the county to maintain a school six months and pay each teacher not less than the minimum wage. It has also been noted that the moneys received by general county school tax must be used for teachers' wages only. It is necessary for districts satisfied with maintaining only minimum standards to raise by taxation moneys additional to those derived from the county and the state. Districts are permitted to devote the proceeds of not more than ten mills of the special tax levy to these purposes.<sup>51</sup>

Items of school expenditure which the district is expected to finance by its special school tax are shown in the following schedule.

Items of expenditure to be met in part or *in toto* by special school tax:<sup>52</sup>

1. All districts: (1) teachers' wages (only in part as already noted); (2) public library books; (3) purchase of school lots (upon vote of district), school houses, erection, removal, repair, rent, and insurance; (4) furniture and equipment; (5) free textbooks for indigent children (or for all upon a majority vote); (6) tuition of pupils attending school in another district; (7) transportation of pupils; (8) pupils' board if transportation is unfeasible.

2. First-class districts only: (1) playgrounds; (2) schools (continuation, part time, evening, vocational, opportunity, for aliens, open air); (3) special subjects: instruction in and teachers

<sup>48</sup> *Colorado revised statutes*, 1908, p. 270, sec. 440; p. 292, sec. 535.

<sup>49</sup> *Colorado school laws, annotated*, 1917, p. 165, sec. 336.

<sup>50</sup> *Ibid.*, p. 162, sec. 331.

<sup>51</sup> *Colorado educational laws*, 1919, pp. 34-35, sec. 1. Minimum salaries per month: \$60 in third-class districts, \$75 in first- and second-class districts.

<sup>52</sup> *Colorado school laws, annotated*, 1917, pp. 68-71, sec. 134; p. 165, sec. 336; *Colorado educational laws*, 1919, pp. 36-37.

of such subjects as drawing, music, manual training, home economics (including care of children); industrial subjects; vocational subjects; subjects for the training of such special teachers, normal training subjects.

The amount to be raised by the district or special school tax is determined in third-class districts by the vote of the qualified electors;<sup>53</sup> in first- and second-class districts by school boards.<sup>54</sup> The procedure involved in levying district taxes is similar to that involved in levying the county school tax. The district determines in advance the amount of money necessary to be raised by special school tax for the ensuing year, such levy in third-class districts not to exceed twenty mills. Thereupon the district school board certifies to the board of county commissioners the aggregate amount to be raised by special school tax in a statement showing: "the items composing said aggregate and the purpose to which it is intended to devote each sum so itemized. It shall thereupon be the duty of the county commissioners to levy, at the same time that the other taxes are levied, such rate, within the limits allowed by the law, as will produce the aggregate amount so certified."<sup>55</sup>

*District bonds and bond taxes.*—For the sake of raising moneys for erecting and furnishing school buildings or purchasing grounds, or for funding floating debts, districts are empowered to issue bonds, provided that the amount of bonded indebtedness of any first- or second-class district shall not exceed 5 percent or of any third class, 3.5 per cent of the assessed value of the property in such district for the year next preceding the date of said bonds. The interest and principal of such school bonds shall be paid by a tax levied and assessed by the county commissioners on the taxable property of the district.<sup>56</sup>

*District high-school tax.*—Union high schools, in districts "organized from districts contiguous to and including an incorporated city or town in fourth- and fifth-class counties" are supported in part by their quota from the general fund by apportionment

<sup>53</sup> *Colorado school laws, annotated*, 1917, p. 96, sec. 164.

<sup>54</sup> *Ibid.*, p. 61, sec. 120. "In districts of the first and second class the boards, after organization, shall exercise all the powers given to the electors of school districts of the third class."

<sup>55</sup> *Ibid.*, p. 165, sec. 336.

<sup>56</sup> *Ibid.*, p. 9, secs. 14-15; pp. 12-13, sec. 23; *Colorado educational laws*, 1919, p. 10.

and in part by a special high-school tax of "not less than one nor more than three mills on all taxable property therein."<sup>57</sup>

*Teachers' retirement fund tax.*—"In every school district of the first class there may be created a school teachers' retirement fund, which shall be controlled by the board of school directors of the school district concerned."<sup>58</sup> "The moneys for the use of the public school teachers' retirement fund shall be secured by a special levy upon the said school district, such special levy, however, not to exceed one-fifth of one mill, and from any gifts or bequests which may be made to the said fund."<sup>59</sup>

*Fines.*—Although the proceeds of all fines, federal, state, and county, are eventually apportioned among the districts, only two of the many fines consigned to schools may be regarded as district fines: (1) fines of five to twenty dollars imposed upon a parent or guardian who fails to require a child of compulsory school age to attend school;<sup>60</sup> (2) fines for violations of laws governing the construction of public buildings (transferred to the public school fund of the county, city, or incorporated town in which the misdemeanor is committed). These fines were listed with the sources of county aid. They must be included also among district sources, since cities and incorporated towns are organized as school districts.<sup>61</sup>

The following three tables show the sources from which all school moneys are derived in Colorado, the increase of school revenue in 1915 over that of 1905, and the relative importance of the state, the county, and the district as sources of school revenues.

The relative importance of state, county, and district revenues may be inferred from the fact that in the year 1914-1915, 7 percent of the total school revenue was derived from state sources, 22 percent from county sources, and 71 percent from local sources.<sup>62</sup>

In 1915 eleven counties derived from 1 to 5 percent of their total revenue from state sources, one county derived a similar

<sup>57</sup> *Colorado school laws, annotated*, 1917, p. 142, sec. 281, note.

<sup>58</sup> *Ibid.*, p. 170, sec. 341.

<sup>59</sup> *Colorado educational laws*, 1919, p. 33, sec. 4.

<sup>60</sup> *Colorado revised statutes*, 1908, p. 292, sec. 535; eight to fourteen years is the compulsory school age under ordinary conditions. For an explanation, see the section here referred to in the revised statutes.

<sup>61</sup> *Ibid.*, p. 270, sec. 440.

<sup>62</sup> *Report of the Colorado school system*, pp. 34, 36.

TABLE V. SOURCES OF COLORADO COMMON-SCHOOL REVENUES, 1919

CLASSES OF SOURCES	FEDERAL	STATE	COUNTY	DISTRICT
Permanent funds and lands	National forest reserve fund	Public School fund	None	None
Appropriations	Smith-Hughes grants	\$10,000 annually to administer S-H work; appropriations to match S-H grants	None	None
Fines and forfeitures	Fire fines	Mining; state report publishing	For twenty-one different offenses	Truancy fines; building fines
Bonds	None	None	County high school <sup>(a)</sup>	District bonds <sup>a</sup>
School tax	None	None	2.5 mills general county school tax; high-school tax; four-mill high-school tax; special bond tax	Special school tax, bond tax; high-school tax; teachers' retirement fund tax

<sup>a</sup> For raising moneys for erecting and furnishing school buildings, for purchasing grounds, or for funding floating debts.

TABLE VI. COLORADO SCHOOL REVENUES IN 1905 AND 1915<sup>a</sup>

	1905	1915	
		Amount	Percent from Source Named
Amount on hand July 1 held by county and district treasurers . . . . .	\$ 889,070.59	\$1,064,008.55	11+
From general fund by apportionment <sup>(b)</sup> . . . . .	1,095,487.32	2,061,977.28 <sup>(c)</sup>	21+
From special (district) tax	2,804,960.60	5,080,195.41	53.6
From all other sources . . .	478,938.04	1,264,308.01	13+
Total receipts . . . . .	\$5,268,456.55	\$9,470,489.25 <sup>(d)</sup>	

<sup>a</sup> Colorado state superintendent of public instruction reports, 1905-6, p. 256; 1915-1916, p. 41. Percent computed.

<sup>b</sup> General fund by apportionment includes moneys paid to districts derived from (1) national forest reserve fund; (2) state funds; (3) county funds.

<sup>c</sup> In 1914-1915, \$598,607 derived from public school fund (*United States commissioner of education report*, 1917, 2:51) and \$1,570,493 from county taxation (*Report of the Colorado school system*, p. 34). The total of these two sums, \$2,169,100.00, is greater than that reported for the entire general fund by apportionment by the superintendent of public instruction.

<sup>d</sup> The revenue for 1915-1916 as given in the *United States commissioner of education report* for 1917, volume II, is identical with that given in the *Report of the state superintendent of public instruction*, 1916, for the year ending June 30, 1915. If one subtracts (in latter report) the balance on hand, \$1,064,008.55, from the total, \$9,470,489.25, the total revenue is the same as the United States commissioner of education reports, that is, \$8,406,480.70. Adding the items given in the commissioner's report as income from the permanent funds and state tax, one gets \$2,061,977, the same as the state superintendent reports for general fund. Adding in state report the items on special tax and all sources one gets \$6,344,503.42, same as commissioner's item for local tax.

percent of its total revenue from county sources, and seventeen counties derived from 81 to 85 percent from district sources. Table VII presents these data for the entire state.

TABLE VII. PERCENT OF TOTAL SCHOOL SUPPORT DERIVED  
BY COUNTIES FROM STATE, COUNTY, AND DISTRICT  
REVENUES, 1914-1915<sup>a</sup>

PERCENT	NUMBER OF COUNTIES DERIVING INDICATED PERCENT OF SUPPORT FROM			PERCENT	NUMBER OF COUNTIES DERIVING INDICATED PERCENT OF SUPPORT FROM		
	State Fund	County Fund	District Fund		State Fund	County Fund	District Fund
1-5	11	1	.....	46-50	.....	1	0
6-10	46	12	.....	51-55	.....	.....	2
11-15	4	16	.....	56-60	.....	.....	1
16-20	2	16	.....	61-65	.....	.....	1
21-25	.....	9	.....	66-70	.....	.....	13
26-30	.....	4	.....	71-75	.....	.....	13
31-35	.....	1	.....	76-80	.....	.....	13
36-40	.....	1	.....	81-85	.....	.....	17
41-45	.....	2	1	86-90	.....	.....	2

<sup>a</sup> Computed from data given in *Report of the Colorado school system*, p. 35.

(To be concluded in November)

## Editorials

### CONCERNING EDUCATIONAL POLICY

The announcement of the JOURNAL OF EDUCATIONAL RESEARCH as it appeared in the January, 1920 number emphasized the practical character which the Journal wished to assume. We were sure that much writing on research topics was hard reading even for the superintendent who is also a student. It was our suspicion that not all the obscurity of this writing was necessary. To be quite frank, we felt—without at that time having put the feeling to the test—that no small amount of the difficulty which people experience in reading accounts of investigations was due to clumsy presentation and careless editing. Our experience since last January has converted our suspicions into certainty. We have consciously studied educational reporting and we have noticed many things. We have discovered problems in which some of the essential data were omitted and conclusions which were erroneously stated. We have found computations that wouldn't check up and two or three different names used for the same blank, or method, or group. We have read one number in the text and another in the table to which the text referred. Our attention has been called to equations with the signs left out, to formulas in which wrong letters and numbers occurred, and to graphs printed upside down. As to English—well, let him that is without fault cast the first stone.

Nevertheless, it would be idle to suppose that even the best expository method on the part of the author and the most sympathetic treatment on the part of the editor could make certain theoretical articles understandable to those whose training has not made them acquainted with their fundamental assumptions and terminology. Nothing, for example, could be clearer than the series of articles by Dr. Ayres which appeared in our March, April, May, and June numbers. Yet the very notions underlying these articles make them readable to but few school people. A new method of computing correlation and regression can be appreciated only by those who know the meaning of correlation and regression.



We do not labor under the delusion that our Journal can ever become a handbook for ill-trained teachers. Nor do we think even relatively well-trained teachers can reasonably be expected to be interested in every article. The usual process of specialization operates to prevent this. Education is a very broad idea, and educational research is not less so. Each one who opens this particular number of the Journal has his own special activity. If he is in the high school he is not likely to care much for an article about the primary grades. If he is a classroom teacher, supervisory problems will only mildly interest him. If he teaches chemistry, measuring the teaching of Latin will not excite him.

One may, however, properly contend that if education is broad and diversified, it is also one and indivisible; and that educational people ought to have interests beyond the range of their particular activities. This is a reasonable view; and it is not an unworthy purpose of our Journal to exalt among teachers, principals, and superintendents what the Herbartians used to call the "many-sided interest."

Yet our readers will be fortunate if, even though they have this many-sided interest, they find as many as one article in each of our issues which appeals to them. And we too shall be fortunate if this result is attained. To accomplish it two kinds of effort seem to be justified.

In the first place, we are justified in offering—and until such time as other periodicals take over certain phases of research we intend to offer—a diversity of material. For the research man we shall offer an occasional statistical or technical article. It looks as if we might have about one in each number. For the administrator, the supervisor, and the teacher whether in city or country we shall have something to present. The material we have in hand permits us to be confident on this point. Accordingly, each educational worker will, we hope, find something he can use. He will also find things which we believe will serve to broaden his interests.

In the second place, we think we are justified in providing material that will explain to those who have not had opportunity to study research methods the conceptions that are needed to understand them. One of the obvious needs is the field of statistics. We contemplate publishing this year a series of simple statistical articles—articles designed to tell to teachers, principals,

and superintendents the way to handle the quantitative work which they are increasingly called upon to do. We shall distinguish in these articles three purposes: (1) to give to educational workers a mastery of the statistics which they are now using; (2) to add to this some of the statistical methods which they would find useful if they were acquainted with them; and (3) to present such further material as they will need in order to read modern educational literature understandingly.

B. R. B.

### RESEARCH IN TEXTBOOK PUBLISHING

The time will come when every important textbook publishing house will have its research man. It is the day of research in business. There is scarcely an industry that is not employing one or more experts, not as purchasing, selling, or production managers, but merely as students of the industry or of some of its phases. These experts are almost literally "turned loose" to discover new facts about the business, to make new combinations, to invent, standardize, and refine.

In the textbook business it is clear that research workers in education are needed. The critical attention now being given to the contents of school books discloses many ways in which they may be improved. Not long ago we heard a very able man, himself an eminent research worker, say after having examined minutely a large number of texts, that most books were adopted without anyone knowing what they contained—neither the committee that judged them nor the teachers who used them. Of course, he did not mean that the chief topics presented in the books were not known—although even that degree of knowledge is often lacking. What he meant was that the contents of the books were unanalyzed with reference to desirable objectives.

For example, if children may be expected to be able to handle seventy-five digits a minute in adding columns of figures, we shall want to know whether in a given arithmetic book the opportunities to add are sufficient to insure the desired result under average conditions and with normal children.

This simple illustration goes quite beyond the scope of the teacher. It demands the attention of the research worker. In the first place, is the standard of seventy-five digits a minute reasonable? If not, what is reasonable? This is clearly a social

question, involving a determination of the degree of skill in adding which is currently required. In the second place, how much should we exceed the social requirement in order to insure through "overlearning" that the pupil will meet the social demand after the practice of the skill has been discontinued? And in the third place, how much repetition of the opportunity to add is needed in order to meet the requirement? With this is combined the question of the distribution of these opportunities. Should they occur at frequent intervals or only occasionally? How frequently and how much opportunity at each occurrence?

Again, it is clear that addition of integers is a complex process. Different combinations of single digits have different difficulties and require different amounts of practice before the same degree of skill may be acquired in handling them. For example, adding 6's, 7's, 8's, and 9's is harder than adding 1's, 2's, 3's, and 4's. Yet Dr. Thorndike reported at the last Conference on Educational Measurements at Indiana University that a recent analysis of several arithmetics had revealed the fact that four times as many opportunities were afforded to add 1's, 2's, 3's, and 4's as were afforded to add 6's, 7's, 8's, and 9's. When we have found this out, we say at once that these books are badly made. Yet it is practically certain that writers of arithmetics ever since arithmetics have been written have been giving several times as much drill on easy combinations as on hard ones. It is doubtful if any of them ever thought of the question. Indeed, only lately have we learned how greatly the combinations differ in difficulty. Even as close a student of arithmetic as Courtis assumed in his early testing that their difficulties were substantially the same. This, by the way, may serve to illustrate the way in which new knowledge in education is accumulating and the unexpected applications that may be made of it.

Nor should we suppose that this remarkable inversion of emphasis is confined to addition. Dr. Thorndike also reported similar and even greater excess of drill on easy than on hard combinations for subtraction, multiplication, and division.

But having ascertained that there are more easy combinations in the arithmetics than hard ones, we have not yet carried our research problem very far even in the field of adding single digits. We next want to know how much more drill should be provided on hard combinations than on easy ones. Moreover, those classed as hard are not equally so. There must be still finer distinctions

We may also observe that these are not notions of that viewy kind, the exploitation of which has produced so many unusable books. Even the most conservative publisher would hardly deny the advantages of distributing drill according to the difficulty of operations; and a book which embodied such a feature would be neither more difficult to use nor more costly to manufacture.

But adding is not merely the combining of single digits. There are the operations of "bridging the tens." of "carrying," and of sustaining the attention throughout the adding of a long column—to say nothing of the operation of writing the figures under each other so that units will fall under units, tens under tens, etc. How much drill should a textbook afford in these particulars?

Clearly, too, the decision in these matters depends in no small degree upon the two factors which we have called "average conditions" and "normal children." What are the conditions which we are justified in calling "average"? Obviously a textbook which addresses itself to conditions above or below average may be justified only when the extent to which it does so is revealed. Thus an arithmetic might be announced as follows: "This book is designed to be used by teachers who have had normal school training and at least one year of experience and who teach but one grade of not more than thirty pupils." We feel sure that not a few arithmetics ought to be so announced. Our experience also leads us to believe that many textbooks—readers, histories, and geographies, as well as arithmetics—are better adapted to children of superior ability than they are to children of normal or inferior ability. Every teacher and supervisor who has had real teaching experience knows that most textbooks are too hard for the grades for which they are designed. The question of "average conditions" and "normal children" should be taken into account in the making of textbooks.

We have called the illustration of adding digits "simple"; and simple it surely is compared to some illustrations that might be taken. Yet it raises a host of questions which are not being satisfactorily answered under the present arrangements for making and publishing textbooks. The publishers need the services of a type of expert who can make a more searching analysis of the method and content of books with reference to the desirable outcomes of teaching and who can check up more objectively the results of the use of the books.

B. R. B.

## Reviews and Abstracts

E. H. CAMERON, *Editor*

BRIGGS, THOMAS H. *The junior high school*. Boston: Houghton Mifflin Company, 1920. 348 pp.

School superintendents, high-school principals, and serious students of education generally, will welcome this contribution of Professor Briggs to the general problem of the junior high school. While there has been a large amount of printed matter devoted to the junior high school, much of this has appeared only in the educational magazines and is not easily accessible to the student of school administration. Professor Briggs has attacked this problem from the proper point of view—that of the conservative who at the same time sees in this movement much that is distinctly encouraging. Professor Briggs, in addition to his scientific attitude toward the subject, has had the advantage of personal visits to many of the better junior high schools of the United States and as educational adviser of the Speyer Experimental Junior High School has had an opportunity to observe at close range the general development of the problem.

Those who are sympathetic with the junior high-school movement have been forced to confess that of the hundreds of schools which have been given the title "junior high school" or "intermediate school," but few have as yet thoroughly adapted their institution to the underlying principles which should control the organization of the intermediate school. In many cases this has been due to a real doubt in the mind of the administrator as to the special function of the junior high school. This book will give a basis for study and consideration which ought to result in a crystallization of ideas and eventually something approaching uniformity in organization. One is impressed by the judicial attitude which Professor Briggs has shown, in many cases, especially in his presentation of the claims and objections to the movement of which, of course, there are many. Although thoroughly sympathetic with the movement and a firm believer in its eventual universal acceptance, he appreciates the strength of the standard objections which are made by those who feel that the traditional 8-4 organization is really better adapted to American ideals and situations. It is to be hoped that states whose legislation practically precludes a general reorganization of education along the lines suggested in this book will within a few years amend their laws so as to make this development possible. It is also to be hoped that the difficulties in the way of utilizing the Smith-Hughes Act in promoting vocational education in the grades may be removed; for without question, especially in rural districts, the eventual organization of schools of the junior high-school type will be so general that vocational education will through them have its best opportunity for rendering really effective service. The reviewer heartily sympathizes with the closing sentence of Professor Briggs' volume, "In its essence, the junior high school is a device of democracy whereby nurture may cooperate with nature to secure the best results possible for each individual adolescent as well as for society at large."

CHARLES E. CHADSEY

HANUS, PAUL H. *School administration and school reports*. Boston: Houghton Mifflin Company, 1920. 200 pp.

This little volume consists of a reprint of a number of papers presented by Professor Hanus at various occasions during the last eight years. A number of the chapters have genuine interest to superintendents as they present clearly Professor Hanus' point of view on the general subject of school administration. Chapter III, which is devoted especially to a consideration of superintendents' reports, was originally presented by him as chairman of Section L—Education, American Association for the Advancement of Science, 1915. To superintendents who have not given a careful consideration to the relative importance of the various topics which naturally are found in the annual report of the superintendent, this chapter will be suggestive and quite worth while. Several of the papers that have been attached at the end of the volume seem, in the opinion of the reviewer, to have little significance in a volume devoted, supposedly, to school administration. They are, however, of interest especially to the many friends of Professor Hanus.

CHARLES E. CHADSEY

BEXELL, T. A. *First lessons in business*. Philadelphia: J. B. Lippincott Company, 1919. 174 pp.

This little book is one of the Lippincott's Thrift Text Series and is edited by Arthur H. Chamberlain, Chairman of the Committee on Thrift Education of the National Education Association.

The author states that he has had two principal thoughts in mind: first, the development of character; second, the introduction of simple thrift lessons which should inspire the pupil with the conviction that economy, self-denial, and prudence are first essentials in the development of a successful business career. The lessons, forty in number, are intended primarily for the eighth and ninth grades. Each lesson is followed by a set of exercises. The following are among the lessons presented: business qualifications, thrift, extravagance and waste, success, bookkeeping and thrift, private personal accounts, boys' and girls' clubs, the household budget and accounts, business forms, filing correspondence and documents, partnership, savings and savings banks and accounts. The materials are well selected for the purpose intended and well presented. With a good, live teacher to motivate the work, this book should prove valuable as an individual reference text.

IRA S. GRIFFITH

GRAVES, FRANK PIERREPONT. *The Maria Hosmer Penniman memorial library of education*. (University of Pennsylvania Bulletin, v. 20, no. 15, May 1, 1920.) Philadelphia: University of Pennsylvania, 1920. 43 pp.

Had this task been undertaken by a bibliographer, he would have compiled a catalog. But this little bulletin is not a catalog. It does more than merely enumerate the titles in the Maria Hosmer Penniman Memorial Library; it so classifies and describes them as to give the reader a brief excursion into the field of the history of education. Both from the standpoint of the treasures it contains, as well as the author's felicitous, yet brief, description of them it is a veritable *hortus deliciarum*, in which even the most casual wanderer can find enjoyment.

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Walter S. Monroe, University of Illinois, Urbana, Illinois.

### Measuring Primary Teaching

The *Texas Outlook* contains a department of school tests and standards edited by L. W. Sackett of the University of Texas. In the September number there is an article on measuring the results of teaching in the primary grades contributed by Leonard Power.

The utilization of home projects in the teaching of agriculture has created a demand for an instrument which can be used in judging the success or failure of pupils in carrying on this type of work. To meet this demand, Mr. Carl Colvin, formerly an Associate in Agricultural Education at the University of Illinois, has worked out, in cooperation with a number of other teachers, a score card. In this score card, achievement in home projects is analyzed into seven major elements: (1) plan; (2) record; (3) efficiency in performance; (4) economic income; (5) skills; (6) knowledge; (7) attitudes. The relative amount of credit to be given under each of these heads has been determined. Full information concerning the score card may be secured by addressing Mr. Colvin at the Department of Public Instruction, Springfield, Illinois.

### South Dakota Research Association

The first annual meeting of the South Dakota Educational Research Association was held at Aberdeen, June 22-23, 1920, under the auspices of the Bureau of Educational Research. The out-of-state speaker for this meeting was Superintendent H. B. Wilson, Berkeley, California.

### Dearborn Group Tests of Intelligence

The publication of group intelligence tests for the primary grades devised by Professor Walter F. Dearborn of Harvard University is announced by the J. B. Lippincott Company of Philadelphia. A manual giving detailed directions for administering the tests has been devised to accompany them. The character of the exercises is indicated by the subtitle of the tests, "Games and Picture Puzzles."

In the price list, issued September first, by the Bureau of Educational Research, University of Illinois, the Bureau announces publication of three new tests, available in November: "Kingsbury Primary Group Intelligence Test," "The Barr Diagnostic Test in American History," and "Illinois Standardized Algebra Test."

### New Tests from the Illinois Bureau of Educational Research

The publication of the Kingsbury Primary Group Intelligence Test is particularly opportune. It is generally recognized that the measurement of the intelligence of children in the primary grades, and especially when they enter school, is of special importance. The fact that

the intelligence of these younger children has seldom been measured is due, in the main, to the lack of suitable instruments for group testing. In making available another group test for primary children, the Bureau of Educational Research is rendering a distinct service.

The current number of *The Colorado State Teachers Bulletin* (July, 1920) bears the title, "A Comparison of Three Diagnostic Arithmetic Tests." The Cleveland Survey Tests, the Woody Arithmetic Scales, and the Monroe Diagnostic Tests, each purporting to be diagnostic in their nature, were studied with respect to this function. The conclusions of the study are to the effect that "there is a substantial agreement between the results obtained by using the Cleveland tests and those obtained by using the Monroe tests." However, the Cleveland tests are considered to be superior because they have been more satisfactorily standardized. The Woody Arithmetic Scales are judged to be "decidedly inferior" for the purpose of diagnosing strength or weakness in the operations of arithmetic.

### Intelligence of Intermediate and High-School Pupils

The Otis Group Intelligence Scale was administered on April 13 and 16 to 69 boys of the intermediate and high-school grades, ranging in age from thirteen to twenty years. These boys were selected because each was failing in large part, if not altogether, in his regular school work. The purpose was to see if the intelligence test might not shed some light upon the cause of the failure in at least some of the individual cases.

The scores ranged from 49 in the case of a boy nearly sixteen years of age to 175 in the case of another boy of the same age. The median score was 120 which is the standard average for fourteen and one-half years of age. The median age of this group was sixteen years.

Point Scores	No. of Boys
40-49	1
50-59	2
60-69	2
70-79	2
80-89	3
90-99	7
100-109	6
110-119	11
120-129	11
130-139	5
140-149	6
150-159	6
160-169	3
170-179	4
Total	69

I. Q.	No. of Boys
31-40	2
41-50	3
51-60	2
61-70	5
71-80	8
81-90	14
91-100	11
101-110	8
111-120	7
121-130	7
131-140	2
Total	69



The scores for the boys of the various ages were compared with the Otis tentative standard and the given distribution of intelligence quotients was obtained.

As will be noted, less than 35 percent of these boys reached the normal standard of 100. The median falls approximately 10 percent below the standard. Of the 65 percent below normal about one-half are so far below as to account at once for their failure to make good in high-school classes. The failure of at least one-third of the group positively cannot be attributed to mental deficiency if the results of this test are to be relied upon.

H. C. DALEY

*Survey Department, Highland Park Public Schools,  
Highland Park, Michigan.*

### Some Results in Using Starch's Arithmetic Reasoning Test

On May 25, 1920 the teachers at Grand Rapids, Michigan, who had taken courses in educational tests and measurements, administered Starch's Arithmetic Reasoning Test to all normal pupils in grades III-VIII. The following is a comparison of the general results for Grand Rapids and Starch's own standards.

TABLE I. SUMMARY OF RESULTS FOR GRAND RAPIDS

Total points for grades III-VIII inclusive.....	107.7
Total standard points for the same grades.....	100.8
Difference in points.....	6.9
Percent above standard.....	7

TABLE II. GRADE SCORES AT GRAND RAPIDS COMPARED WITH STANDARD SCORES

SCORES	GRADE											
	VIII		VII		VI		V		IV		III	
	2	1	2	1	2	1	2	1	2	1	2	1
Grand Rapids...	13.0	12.3	12.0	11.4	10.7	10.1	9.1	7.8	6.9	5.6	4.8	4.0
Standard <sup>a</sup> .....	12.8	12.0	11.2	10.4	9.6	8.8	8.0	7.2	6.4	5.6	4.8	4.0
Points above standard.....	0.2	0.3	0.8	1.0	1.1	1.3	1.1	0.6	0.5	0	0	0
Percent above standard.....	2	3	7	10	11	15	14	8	8	0	0	0

<sup>a</sup> These are standards calculated for May from Starch's standard June scores.

According to Table I there was at Grand Rapids a total of 107.7 points for all grades, while the total standard points for these grades is 100.8. The difference in points is 6.9 or 7 percent above standard. The 107.7 and 100.8 may be obtained by totaling the scores for each grade in Table II which shows the scores by grades.

In order to understand how each grade stood in respect to the standard, we note its score and the standard score in Table II, find their difference and divide this difference by the standard score. This gives the percent above or below standard. A glance at the table will show that no grade in Grand Rapids schools is below the standard on this particular test. This is not at all surprising when we remember that these same pupils stood 4 percent above standard in rate and in comprehension on Monroe's Silent Reading Test.<sup>1</sup> It might be well for inexperienced teachers to note this fact: that failure to solve verbal problems may be due to a lack of *training in reading rather than a lack of training in numbers*. It might, therefore, be advisable, at least occasionally, to use verbal problems in training pupils in technical reading.

CHAS. D. DAWSON

*Assistant Superintendent of Schools,  
Grand Rapids, Michigan.*

<sup>1</sup>"An experiment in silent reading," *Journal of Educational Research*, 1:414-415, May, 1920.

# National Association of Directors of Educational Research

(E. J. ASHBAUGH, *Secretary and Editor*)

What is educational research? What is the function of a bureau of educational research, or measurement, or efficiency, or whatever name your particular bureau may chance to have? I am proposing these questions directly to you, fellow members, but proposing them openly through the pages of our Journal because I think it worth while for us to reason together, within hearing of the hundreds of superintendents who have not yet organized a bureau in their school systems but who are regular and intensely interested readers of our columns.

Courtis and Packer in the January number of the Journal correctly defined the function of a research bureau. They set out definitely that the bureau should furnish the superintendent and other administrative officers with the accurate, detailed information upon which policies can be and should be determined. I have no desire to restate fragmentarily and poorly what they stated so clearly and completely. I merely wish to call attention to one fact in the case, namely that the function of such a bureau includes the gathering and organizing of data on *every* phase of educational work in the system.

The summer call for news concerning your plans for the coming year; the year which has now gotten well under way and the plans for which are already partly accomplished; brought back a response which upon its face would indicate that the bureaus for whose work our membership is responsible planned to function this year in practically two fields alone: (1) measurement of pedagogical results and (2) measurement of general intelligence. It is true that three or four mentioned "the devising of new tests" but that is so closely allied to the first field that it might almost be so classified. Several state that the mental measurement is being done as an aid in administration, for example, in the promotion and classification of pupils. We shall all be greatly interested in the results secured from the use of the tests but it is evident that we are still working in but a small part of the field or that the activities of the bureaus have been reported in these two lines to the exclusion of all others.

What about *child accounting*? How many bureaus have been working on the problem of accurately ascertaining the extent to which the children are taking advantage of the opportunities offered, or the still greater problem of the extent to which the community is recognizing and assuming its responsibility for the educational progress of all its people?

What about *buildings*? How many bureaus are keeping continually before the administrative officers of the system an accurate interpretation of the conditions as they now exist and the best possible indices of future conditions in order that a safe, sane, but wise and progressive program may be developing?

What about *finance*? How many bureaus are keeping close check on receipts and expenditures, on changing values of real estate and assessed or taxable values, on levys and assessments, etc., so that wild rumors and unjust attacks on the financial policy of the school system can be quickly answered with accurate data?

What about *information*, real, accurate, classified, easily usable information, just the kind that one would expect from a bureau of educational research, in any of the many other phases of our complex school problem?

Enough has been said. What about the work of your bureau in these other fields?

PLANS FOR 1920-1921. CLIPPINGS FROM A FEW WHO APPARENTLY PLAN  
SOMETHING A LITTLE DIFFERENT

Branson, Long Beach, California: "Continue study of best means of grouping and program planning suited to pupil ability. Progress tests in spelling and writing."

Courtis, Detroit, Michigan: "Tests in many new subjects, household economics, lettering, sewing, etc. Measurement of effect of supervision. Measurement of effect of project method."

De Voss, Emporia, Kansas: "Expect to give extension classes in measurement in several cities . . . complete work started last year in new tests in Latin, music and manual training."

Everly, St. Paul, Minnesota: "Arithmetic tests four times during year, grades II-VIII; Ayres Spelling three times during year, grades II-VIII; 100 Demons three times during year, grades II-VIII." (Judging from the elaborate program of testing Mr. Everly put through last spring and the program he outlined for this year, as well as the frequency of the testing, he is not afraid of the use of measurement in St. Paul.—EDITOR.)

Fordyce, University of Nebraska: "Shall attempt to adapt teaching material and procedure to such students as vary markedly from the norm of their grade."

Harlan, Lewiston, Idaho: "Standardize new test in reading in state. State-wide use of Monroe's Reasoning Test in arithmetic."

Henry (Mary Bess), Santa Ana, California: "Additional study of Mexican school children."

McCall, Teachers College, Columbia University: "Construction of several reading scales. Simplification of the procedure of scale construction. Simplification of the procedure for computing class and pupil scale scores."

Theisen, State Department, Madison, Wisconsin: "Problem of school records for cities. Plan to secure greater uniformity and efficiency in record keeping."

(Dr. Theisen has gone to Cleveland. The state department at Madison, however, with Dr. Alexander and Mrs. Flemming on hand and with the probability of the early filling of the vacancy caused by Dr. Theisen's change, will undoubtedly continue to do the customary business. It may be fairly assumed, therefore, that the project to secure greater uniformity and efficiency in record-keeping will be carried through.—EDITOR.)

Sutherland, Los Angeles, California: "Psychological test given 800 teachers applying for positions in our schools, as part of regular examination. Previous examinations indicate teacher median about seventh grade in arithmetic and tenth in silent reading.

"Our force is at work this summer preparing modifications of our adjustment room materials. The old materials and the plan used have brought over one thousand children up to grade during the past two years in thirty schools. We are promised extensions next year.

"As an item of interest to all members of this Association, permit me to call attention to the value of an exhibit of educational and general intelligence tests. Such an exhibit in Los Angeles attracted nearly every principal and a large number of teachers. Result—a huge number of requisitions for tests to be used next year in the Los Angeles schools."

# Journal of Educational Research

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## COMPARATIVE RESULTS IN INTERMEDIATE AND ELEMENTARY SCHOOLS AT LOS ANGELES

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The nine questions considered in this study are all phases of two larger problems: (A) To what extent do junior high-school pupils persist in school and (B) To what extent are secondary-education electives economically offered in the intermediate school? This study does not consider all the data necessary for the solving of these larger problems, but it does present facts and reach some conclusions that must be possessed before the problems can be satisfactorily solved.

Through the courtesy of Superintendent Shiels and with the cordial cooperation of his associates, this study concerns the schools of Los Angeles. This city was chosen for two reasons: first, because junior high schools, or intermediate schools, have been established there long enough and definitely enough for effects to be due to more than initial enthusiasm or to chance; and, second, because in that city it was possible to contrast the persistence of pupils of representative intermediate schools with that of pupils of neighboring and similar elementary schools. The schools chosen were the Fourteenth Street, the Thirtieth Street, and the Berendo Street Intermediate Schools; and the Vermont Avenue, the West Vernon Avenue, the Normandie Avenue, the Twenty-Fourth Street, the Thirty-Sixth Street, the Thirty-Seventh Street, and the Sixty-Sixth Street Elementary schools. These two groups of schools were regarded by various local school men as similar in clientele, teachers, etc.

At this point the reader should get clearly in mind the conditions imposed by the two different types of organization with

which we are dealing. Pupils transferred to senior high schools upon graduation from intermediate schools have finished the ninth grade. Those transferred to high schools upon graduation from elementary schools have finished only the eighth grade. Since those coming from intermediate schools are a year ahead of those coming at the same time from elementary schools, it is clear that those who have finished only the eighth grade must be allowed a year in which to pass through the ninth grade. Accordingly, the intermediate-school class of a given year must be compared with the elementary-school class of a year earlier. This difference of one year will bring together both elementary and intermediate groups of pupils into the same classes throughout the three upper grades of the high school.

A complete transcript was made of the record of (a) each pupil transferred June, 1913, and June, 1914, from the three intermediate schools to the senior high schools; and (b) of each pupil transferred June, 1912, and June, 1913, from the seven elementary schools to the high schools. In all 422 records of pupils from the intermediate schools were transcribed and 434 records of pupils from the elementary schools. As is usually the case, not all the transcriptions were complete or entirely accurate. In a few cases, pupils recorded as transferred to a certain high school could not be found. In other cases pupils recorded as leaving school were found to have entered high school and even to have graduated. Sometimes pupils were not recorded as having graduated from high school even though they had 32 or more credits; while a few pupils were recorded as having graduated without a sufficient number of credits. There was some inconsistency in the amount of credit recorded for a given amount of work; and the letters NM (no mark) were apparently used to indicate work uncompleted at or before the end of the semester. When difficulties occurred, an interpretation as intelligent as possible was made; or, in the more obscure cases, the records were thrown out. There is no reason to believe that any injustice has been done to either type of school.

Satisfactory records were transcribed as indicated in the following schedule. Among the 402 pupils from the intermediate schools there were 20 non-graduates from the Thirtieth Street School. These were sometimes counted and sometimes not,

according as graduation was or was not likely to affect the matter under consideration. Since the different bases of computation are more likely to confuse than to help the reader to understand this study, numbers have generally been transmuted into percents.

Class	Elementary School	Intermediate School
1912	178	.....
1913	235	201
1914	.....	201
Total	413	402
No. who rec'd marks in high school . . . .	255 <sup>a</sup>	315

<sup>a</sup> Two hundred eighty were found to have been on register, but 25 did no work for which they received marks.

1. *What percent of pupils completing the eighth grade in each type of school enter the ninth grade?*—Unfortunately data concerning the persistence of pupils from the eighth grade of the two types of schools were not similarly collected, and in consequence they cannot be strictly compared. Our records for intermediate-school pupils were not obtained until the pupils had completed the ninth grade. We cannot, therefore, speak of the group of intermediate-school pupils as it was constituted when they completed the eighth grade. Of the 413 pupils who completed the eighth grade in the elementary schools, 67.8 percent were found to have been on register in the Los Angeles high schools though only 61.7 percent received marks there. To compare with this, we have only the statement published by the intermediate-school principals<sup>1</sup> that 87.2 percent of the 1,550 pupils who completed their eighth grade in 1914 remained in the same schools or were transferred to other intermediate and high schools in Los Angeles. Insofar as these figures are comparable, they show a marked superiority for the intermediate schools in holding pupils who complete the eighth grade.

<sup>1</sup> "The work of the intermediate schools of Los Angeles," *Elementary School Journal*, 15: 361-77 (375), March, 1915.

2. *What percent of pupils from the two types of schools completing the ninth grade enter the tenth grade?*

Here the data concerning pupils from the two types of schools are original and strictly comparable.<sup>2</sup> Of the 280 pupils from the elementary schools who were found to have been students in the high schools, 85.0 percent received marks in the tenth grade of the high schools. Of the 402 pupils who completed the intermediate schools, 75.1 percent were found to have entered Los Angeles high schools (i.e. the tenth grade), and 70.6 percent received marks there at the end of the first half year. These figures give support to the frequently repeated suspicion that the 6-3-3 plan of school organization would move forward the point of elimination from the end of the eighth to the end of the ninth year. Of the pupils studied, 14.4 percent more of the intermediate-school group than of the elementary-school group (the difference between 85.0 percent and 70.6 percent) dropped out between the ninth grade and the middle of the tenth.

In the article previously referred to<sup>3</sup> the percent of 742 pupils graduating from the intermediate schools in 1914 and entering high schools was given as 88.9. The reasons are not apparent why this percent is more than one-sixth higher than that for the smaller group used in this study.

Because of the differences between the figures found by this study and those reported by the principals, it is impossible to compare with confidence the persistence of the two groups of pupils from the eighth to the tenth grade. The best combination of the figures gives the intermediate-school group an advantage of 4 percent. Be that as it may, in weighing one type of school against the other, one must decide whether it is better for society to have 194 pupils in a thousand (87.2 less 67.8 percent) more pupils receive a ninth year of education in an intermediate school or to have 144 more in the thousand who complete the elementary grades (85.0 less 70.6 percent) receive a tenth year in the 8-4 organization.

3. *What percent of the pupils prepared in the two types of schools and reaching the tenth grade persist through the remaining semesters?*

<sup>2</sup> As the number transferred to schools in other cities or to non-public schools in Los Angeles is small (thirteen pupils from the intermediate schools and twenty-eight from the elementary schools) it has been disregarded.

<sup>3</sup> "The work of the intermediate schools of Los Angeles," *Elementary School Journal*, 15: 361-77 (375), March, 1915.



TABLE I. PERCENT OF PUPILS PERSISTING FROM THE TENTH GRADE

	XA	XB	XIA	XIB	XIIA	XIIB
Elementary-school group (230)	100	93	82.6	77.4	66.1	26.5
Intermediate-school group (284)	100	92.3	81.3	78.5	59.5	25.4

Table I shows that after pupils reach the tenth grade it makes practically no difference in their persistence whether they were prepared in elementary or intermediate schools. The only significant difference in the pairs of percents recorded is in the lower twelfth grade. As will be shown elsewhere, this is due to the fact that the pupils from the intermediate schools bring with them enough secondary-school credits to graduate somewhat earlier than the pupils prepared in the grammar school; some of the brighter and more industrious ones apparently graduate in two years after leaving the intermediate school.

4. *What percent of each tenth-grade group graduates?*

TABLE II. PERCENT OF PUPILS IN GRADE X GRADUATING OR STILL IN HIGH SCHOOL

	Elementary School 1912	Intermediate School 1913	Elementary School 1913	Intermediate School 1914	Elementary School 1912-1913	Intermediate School 1913-1914
Graduating from high school . . . . .	52.6	61.8	20.7	38.7	34.8	50.3
Still in high school.	9.6	2.6	37.9	16.0	25.5	9.3
Graduating or still in high school . . . . .	62.3	64.4	58.6	54.7	60.2	59.6

By reference to Table II it will be seen that of the pupils from each type of school entering the tenth grade a considerably larger percent of those prepared in the intermediate schools have completed the high-school course of study. Even of the 1912 class in the elementary schools, whose members had nine semesters

in which to graduate, 9.2 percent fewer pupils completed the course than was the case with the corresponding 1913 class from the intermediate schools. If all of both groups still remaining in the high schools complete the course, the elementary group will still be inferior by 2.1 percent. The 1913 class from the elementary schools has graduated 18 percent fewer of its tenth-grade pupils than the corresponding intermediate-school class; and if all the pupils from both types of schools still remaining on register graduate, the elementary-school group will have a small advantage. Of course, the nearer pupils are to the end of their course, the more likely they are to continue to graduation; consequently the conclusion seems warranted that of the pupils from the two types of schools who reach the tenth grade, practically the same number graduate. Table III suggests—and the fact becomes more evident in the next section of this study—that the pupils from the intermediate schools graduate from high school earlier than their classmates from the elementary schools.

5. *What is the average number of secondary education credits brought to the high schools by intermediate-school graduates?*—The 315 graduates of intermediate schools who entered Los Angeles high schools carried with them an average of 10.2 secondary education credits. This means that on the average they had earned in the three years of their intermediate-school course just a little more than the normal amount of credit for one year of high-school work. As a great many pupils in the Los Angeles high schools earn more than eight credits a year, the intermediate schools cannot on the evidence considered claim to save any material amount of time for the average pupil. It is interesting to note that in the article previously referred to, the intermediate-school principals give the same average number of credits (10.2) as earned by their 834 graduates in 1914. They state further that the average for three years had been 11.1.

6. *What is the distribution of secondary education credits earned in the intermediate schools?*—High-school principals have argued that many pupils come to them from intermediate schools with so much advanced credit that they graduate before the senior schools have time to exert on them the influence possible in a normal three-year course. In Los Angeles I heard repeatedly of one girl who had accumulated so much advanced credit that

she was able to graduate from the high school in less than two years. Table III does not show any such extreme case. It does, however, show that provision is made for some pupils, presumably the brighter and more industrious, to earn credits that they may use toward shortening or enriching their course. But only fourteen of the pupils studied had earned credits enough to permit of their saving a half-year of their senior high-school course.

TABLE III. PERCENT OF PUPILS ENTERING HIGH SCHOOLS WITH MORE THAN TEN CREDITS FROM INTERMEDIATE SCHOOLS

	PERCENT OF PUPILS RECEIVING INDICATED CREDITS				
	10-10.9	11-11.9	12-12.9	13-13.9	10-13.9
June, 1913.....	33	16	4	1	53
June, 1914.....	35	17	16	7	75
June, 1913 and June, 1914.....	35	16	10	4	65

It is pertinent to add here that the pupils from the intermediate schools, perhaps because of the opportunity that they had had for acceleration, seem to have been much more stimulated than others to earn additional credit in summer schools. Table IV shows that more than a fourth of the graduates from inter-

TABLE IV. HIGH-SCHOOL CREDITS EARNED IN SUMMER SCHOOLS

	Pupils from Elementary Schools			Pupils from Intermediate Schools		
	1912	1913	1912- 1913	1913	1914	1913- 1914
PUPILS						
Number receiving credits...	8.	18.	26.	43.	36.	79.
Percent taking summer work.	6.2	11.9	9.0	29.1	23.2	26.1
CREDITS						
Number earned.	22.9	38.5	61.4	103.1	52.2	155.3
Average per pupil.....	2.9	2.1	2.4	2.4	1.5	2.0

mediate schools have earned credits in summer schools, while fewer than a tenth of the graduates from elementary schools in their longer high-school course have done this extra work.

7. *Which group earns more high-school credits?*—Table V shows that the pupils from intermediate schools have before leaving school earned on the average 4.8 secondary education credits, equivalent to a half-year's work, more than similar pupils from elementary schools. If comparisons be made between the two classes that have had ample time to graduate from the high schools (elementary 1912 and intermediate 1913) the advantage is with the intermediate schools to the extent of 5.5 credits. To this must be added the fact that the intermediate schools also gave to all of their seventh- and eighth-grade pupils, whether they continued in school or not, the opportunity of doing some work in subjects ordinarily taught in high schools.

TABLE V. AMOUNT OF SECONDARY EDUCATION CREDITS EARNED

YEAR	ELEMENTARY-SCHOOL GROUP		INTERMEDIATE-SCHOOL GROUP			
	Number of Pupils	Average Number of Credits Earned in High School	Number of Pupils	AVERAGE NUMBER OF HIGH-SCHOOL CREDITS EARNED		
				In Intermediate Schools	In Senior High Schools	Total
1912	129	23.0	.....	.....	.....	.....
1913	151	20.8	148	9.7	18.8	28.5
1914	.....	.....	155	10.8	14.0	24.8
Total	280	22.0	315 <sup>a</sup>	10.2	16.6	26.8

<sup>a</sup> Including twelve at Hollywood and Gardenia.

8. *To what extent are electives which have been begun in the intermediate schools continued in the high schools?*—One of the reasons advanced for introducing as electives certain subjects into the intermediate school is that by beginning them earlier pupils may get from them a more thorough training than otherwise. This reason would justify the introduction of these subjects to the extent that pupils *successfully* continue them. The 168 pupils whose records could be traced from intermediate

schools through their high-school courses had credit in the lower school for 250 electives. Of these pupils 82, or 48.8 percent, continued their electives in the high school. Of the 82 pupils who continued their electives 63.4 percent (or 31 percent of the 168) did so successfully—that is, succeeded in getting at least one passing mark after one or more attempts. From the point of view of *subjects* instead of *pupils*, 39.2 percent of the 250 intermediate-school electives were continued in high schools. Of the number continued 62.2 percent (or 24.4 percent of the original number) were continued successfully. The records are not clear whether or not subjects were continued in advanced classes. It should be noted that these are the facts for the pupils who continued into the senior high schools. The percent on the basis of the entire number who took the electives in grades VII-IX would, of course, be much smaller.

It is of interest to know to what extent each of the electives considered was continued. Table VI, which includes, as the preceding figures did not, the records for eighteen non-graduates promoted from the Thirtieth Street School, shows the persistence by subjects. The table reads: 34 pupils elected Latin in the intermediate school, and of these pupils 12 or 35 percent elected Latin in the high schools. French has the best record, with German and bookkeeping the poorest.

TABLE VI. EXTENT TO WHICH INTERMEDIATE-SCHOOL ELECTIVES WERE CONTINUED IN HIGH SCHOOL

SUBJECTS	NUMBER ELECT- ING IN INTERME- DIATE SCHOOLS	PUPILS ELECTING SAME SUB- JECT IN HIGH SCHOOLS	
		Number	Percent
Latin.....	34	12	35
German.....	28	7	25
French.....	19	12	67
Spanish.....	95	42	44
Bookkeeping.....	47	13	28
Stenography.....	58	22	38
Total.....	281	108	

9. *When pupils, having begun a subject in intermediate school continue it in high school, how do their marks in the two schools compare?*—A comparison of the average mark of the last two semesters in the intermediate schools with the marks given to the same pupils for the same subjects continued in the first two semesters in the high schools, shows that the latter are decidedly the lower. In Table VII a change of a full step (e.g., from A to B, from B to C, etc.) is indicated by 2; a change of a half

TABLE VII. DIFFERENCE BETWEEN HIGH-SCHOOL AND INTERMEDIATE-SCHOOL MARKS IN THE SAME SUBJECTS

(Plus means high-school marks were higher, minus that they were lower)

	Plus		0	Minus						N M
	2	1		1	2	3	4	5	6	
Difference.....	2	1	0	1	2	3	4	5	6	N M
Percent of pupils.....	2	4	16	9	28	12	11	3	1	14

step (e.g., from A to B+, B+ to B, etc.), by 1. It will be seen that in the same subjects 6 percent of the pupils secured better marks in the high school than in the intermediate school, and that 16 percent more did as well. It is apparent from data collected but not included in this study that the high schools generally give lower marks than the intermediate schools; but the facts presented in Table VII conclusively support the statements repeatedly made that the intermediate schools do not in the opinion of high-school teachers adequately prepare pupils in secondary-school subjects. The condition is worse than the table indicates, for a number of the pupils considered in this study (records do not indicate just how many) were after a trial placed in lower high-school classes than their intermediate-school records entitled them to enter; and in consequence the marks are partly for "repeated work." Probably no satisfactory articulation of work between schools, even though they be of the same rank, is possible unless there are either very detailed syllabi or objective standards for the measurement of results.

In summary, it seems that the transition from one building to another, whether at the end of the eighth or the ninth grade,

causes an increase in the number of pupils eliminated. The evidence considered in this study goes to show that the intermediate schools of Los Angeles are effective in holding a significant number of pupils for an additional year of education. Although the evidence is not clear on this point, there is probably no material difference at the end of grade x between the two groups (pupils from the elementary schools and those from the intermediate schools) as to the number eliminated. Certainly when pupils get into the tenth grade, whatever their preparation, they tend to persist about equally.

As the graduates of the intermediate schools who entered the high schools brought on the average only 10.2 credits, they could not as a group save even a half-year of the normal course in secondary education. It is shown, however, that opportunity has been afforded for the more gifted and more industrious pupils to accumulate enough advanced credits so that they may save a half year. No pupil among the number studied had enough advanced credits to enable him to save more than one semester in the three-year senior high-school course. Although they have not enabled these 402 pupils materially to decrease the length of their high-school course, the intermediate schools must be credited with having given some secondary education to pupils who have not persisted into the high school, and with having shown to others who did not continue their electives their inaptitude for the subjects. This latter result should give the high-school teachers pupils more worthy to pursue these subjects, but it also tends to count as credits toward graduation fragments of learning that are not likely to have permanency.

The intermediate schools must be credited with two other advantages: first, their graduates seem to have been stimulated to accelerate their courses by taking additional summer work; and second, on the average their graduates accumulate a half-year more of secondary education than do similar pupils who come from the elementary schools.

Fewer than one-fourth of the intermediate-school electives in the foreign languages and commercial subjects were successfully continued in the high schools. This raises the question as to whether a city can afford to offer the conventional introductory courses in foreign languages when the percent of successful

continuance is so small. Either this percent should be increased or the courses should be reorganized so as to be worth while even if they are pursued for but a half-year. It is also evident that there is need of a better understanding among teachers of the same subjects in the different schools as to what pupils should accomplish in a given unit of time.



## THE RESULTS OF THREE TYPES OF DRILL ON THE FUNDAMENTALS OF ARITHMETIC<sup>1</sup>

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The purpose of this paper is to report a study made of three methods of drill on the fundamental operations of arithmetic. The work was done under the direction of Miss Mary Schenk, now a member of the faculty of the University of Wyoming. All the material was obtained from the schools of Lawrence, Kansas. Three buildings for grades iv, v, and vi and the Central Building for grades vii and viii were used. The study was planned and carried out with the cooperation and under the supervision of Raymond A. Kent, Superintendent of the Lawrence Schools and Professor of Education in the University of Kansas. The teachers were in hearty sympathy with the undertaking since it had been preceded by a series of tests revealing a low achievement in the city as a whole in the fundamental operations with numbers. One series of classes, representing grades v to viii, used the Courtis Standard Practice Tests in Arithmetic; another, representing grades iv to viii used the Studebaker Economy Practice Exercises in Arithmetic; and a third, representing grades iv to viii used the best methods of drill which the teachers could devise, without the use of any special material. The Courtis and Studebaker exercises were used according to the directions furnished with them.

The number of children of each grade who participated in each kind of drill is exhibited in Table I.

Practically all teachers who used either type of practice material had had experience with it the year before. For those of whom this was not true, a demonstration of the proper use of the material was made by Miss Schenk before the trial period began. Furthermore, a statement of the achievements of each child in the fundamental operations as revealed by the Courtis Standard Research Test in Arithmetic, Series B was given to

<sup>1</sup> An address delivered before the National Association of Directors of Educational Research at Cleveland, Ohio, February 26, 1920.

each teacher at the beginning of the study. The teachers were encouraged to use this information in giving to each child the sort of drill he most needed.

TABLE I. DISTRIBUTION OF PUPILS BY GRADES ACCORDING TO EACH TYPE OF DRILL

Grade	Pupils Using Courtis Material	Pupils Using Studebaker Material	Pupils Using No Materials
IVB	0	15	20
IVA	0	20	13
VB	10	25	11
VA	20	0	13
VIB	20	0	19
VIA	16	17	24
VIIB	17	21	20
VIIA	13	11	19
VIIIB	21	20	20
VIIIA	16	17	14
Total	133	146	173

An effort was made to equalize the total amount of time consumed daily in each of the three forms of drill, including the time used in passing materials and collecting them. With this end in view and after conferring with those who had used the different materials, the following schedule was agreed upon: fourth grade, 15 minutes; fifth grade, 12 minutes; sixth grade, 10 minutes; seventh grade, 8 minutes; and eighth grade, 8 minutes. All the teachers are believed to have followed this schedule faithfully in as much as the project was regarded as a test of method, and not as a test of the teachers.

Twenty successive days were used in the study, a reduction from the original plan of thirty days made necessary by the closing of some of the schools by the board of health. A relatively brief experimental period was proposed not only because conditions could thus be more carefully safeguarded than they could for a long period but also because the teachers' interest could more certainly be maintained on a high level.

The figures which follow show the gains of classes by the three methods, the median being used as the measure of central tendency in all cases. Figure 1 is for grades IVB and IVA,<sup>2</sup> Figure 2 for grades VB and VA and so on. The base lines are the medians for the whole city of Lawrence. These medians rather than the Courtis standards were used in order to make comparisons from building to building more effective. The figures on the vertical scale represent the number of examples above or below the city median in speed. The percent of accuracy above or below the medians is represented on the same scale, but 1 on the scale stands for 10 percent, 2 for 20 percent, and 3 for 30 percent. In each figure the classes using the Courtis materials are shown on the left, those using the Studebaker in the middle, and those using no special materials on the right. The medians in addition, subtraction, multiplication, and division, both in speed and accuracy as determined by the Courtis test are shown by the lower end of the bar—or upper end of the hollow rectangle—at the beginning of the trial period, and by the upper end of the bar and lower end of the hollow rectangle at the end of the trial period. Thus the bars show gains and the rectangles losses during the period.

TABLE II. AVERAGE GAINS IN PERCENTS ACCORDING TO THE THREE DRILL METHODS

METHOD	GAIN IN	
	Speed	Accuracy
Courtis Practice. . . .	21	16
Studebaker Practice. .	12	11
No special material. .	7	10

As a ready means of comparing the gains under the three methods of drill, the percents which the gains were of the scores made at the beginning of the experiment were calculated for each class in each of the four processes for both speed and accuracy. These percents were then averaged for the groups of classes which worked with each form of drill. Since no fourth grades used the

<sup>2</sup> IVB indicates the lower half and IVA the upper half of the fourth grade.

Courtis material, only grades v, vi, vii, and viii are figured in these averages. By this method, admittedly unscientific, the gains in percent by the three methods stand as shown in Table II.

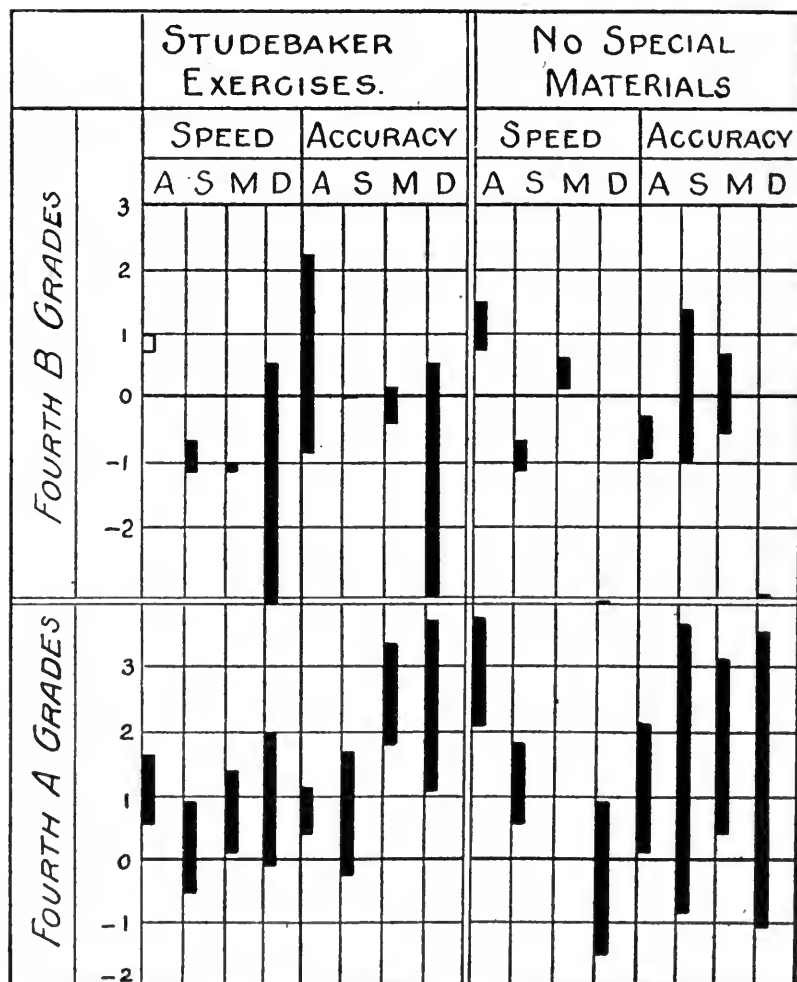


FIGURE 1. RESULTS OF DRILL IN THE FOURTH GRADE. ZERO LINES INDICATE CITY MEDIANS; BARS SHOW GAINS IN CLASS MEDIANS; HOLLOW RECTANGLES SHOW LOSSES. ON THE ACCURACY SCALE 10 PERCENT IS SHOWN BY THE SAME DISTANCE AS 1 ON THE SPEED SCALE. DEVIATIONS ABOVE OR BELOW CITY MEDIANS RATHER THAN OBTAINED SCORES ARE SHOWN.

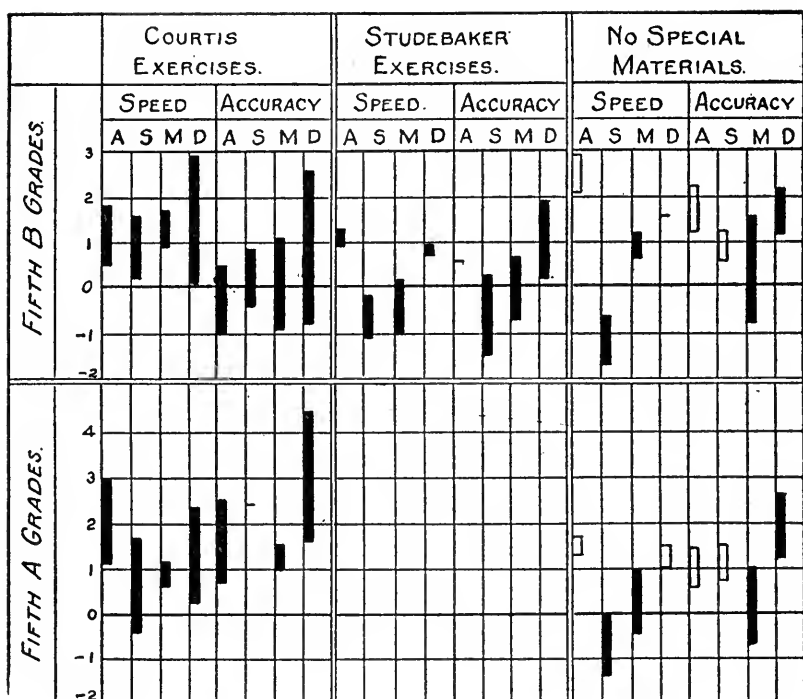


FIGURE 2. RESULTS OF DRILL IN THE FIFTH GRADE. ZERO LINES INDICATE CITY MEDIANS; BARS SHOW GAINS IN CLASS MEDIANS; HOLLOW RECTANGLES SHOW LOSSES. ON THE ACCURACY SCALE 10 PERCENT IS SHOWN BY THE SAME DISTANCE AS 1 ON THE SPEED SCALE. DEVIATIONS ABOVE OR BELOW CITY MEDIANS RATHER THAN OBTAINED SCORES ARE SHOWN.

With this explanation, it is believed the essential facts of the study are revealed in the figures.

The following conclusions seem justified by the facts:

1. The study involves too few classes and too short a period to permit a definite statement of the superiority of one method over another. The evidence must be regarded as pointing to probabilities rather than to established conclusions.

2. The amount of gain in twenty days of concentrated attention to the problem is very striking, no matter what the method.

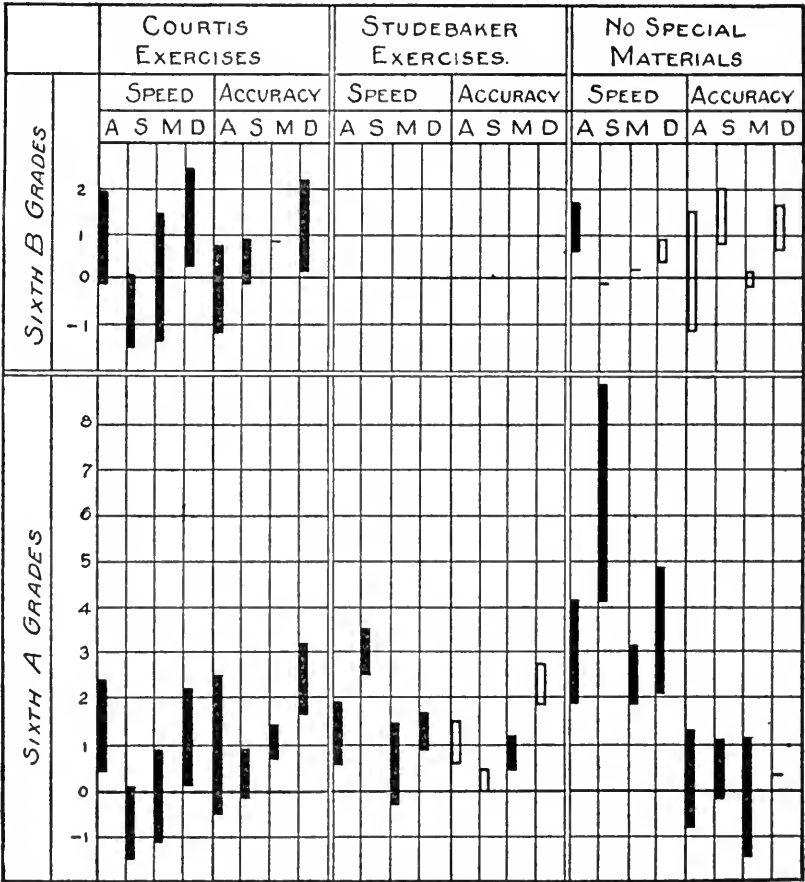


FIGURE 3. RESULTS OF DRILL IN THE SIXTH GRADE. ZERO LINES INDICATE CITY MEDIANS; BARS SHOW GAINS IN CLASS MEDIANS; HOLLOW RECTANGLES SHOW LOSSES. ON THE ACCURACY SCALE 10 PERCENT IS SHOWN BY THE SAME DISTANCE AS 1 ON THE SPEED SCALE. DEVIATIONS ABOVE OR BELOW CITY MEDIANS RATHER THAN OBTAINED SCORES ARE SHOWN.

3. The differences from class to class by the same method suggest that after all the efficiency of any method depends mostly on the teacher who is using it.

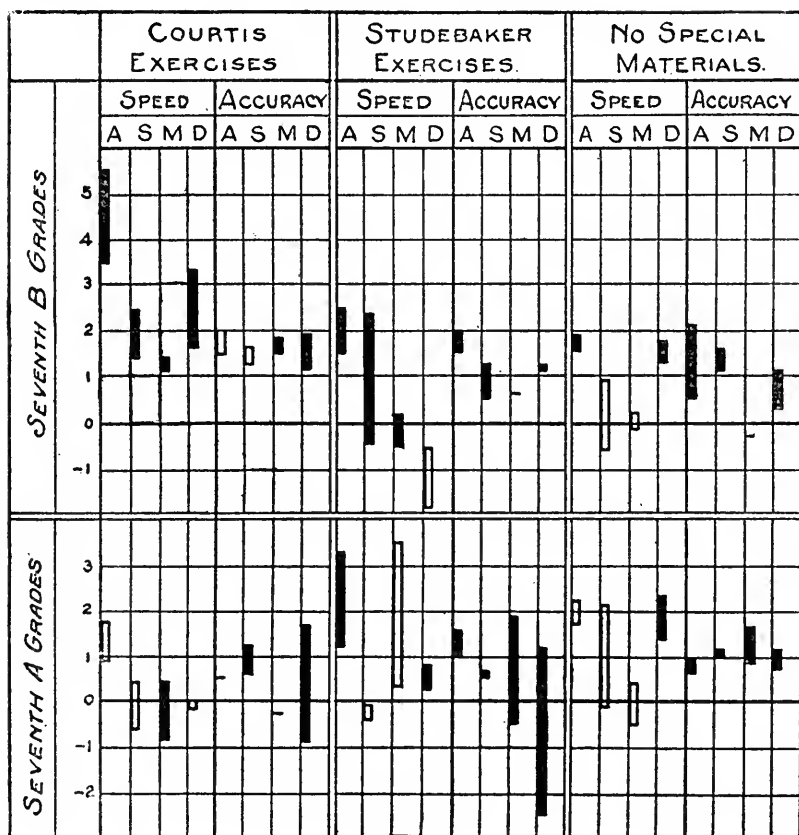


FIGURE 4. RESULTS OF DRILL IN THE SEVENTH GRADE. ZERO LINES INDICATE CITY MEDIANS; BARS SHOW GAINS IN CLASS MEDIANS; HOLLOW RECTANGLES SHOW LOSSES. ON THE ACCURACY SCALE 10 PERCENT IS SHOWN BY THE SAME DISTANCE AS 1 ON THE SPEED SCALE. DEVIATIONS ABOVE OR BELOW CITY MEDIANS RATHER THAN OBTAINED SCORES ARE SHOWN.

4. Gains by all methods were much greater in grades IV, V, and VI than in grades VII and VIII, suggesting that skills resting upon such drills should be established before the seventh grade.

5. Both the Courtis material and the Studebaker material secured greater gains than the ordinary schoolroom procedures;

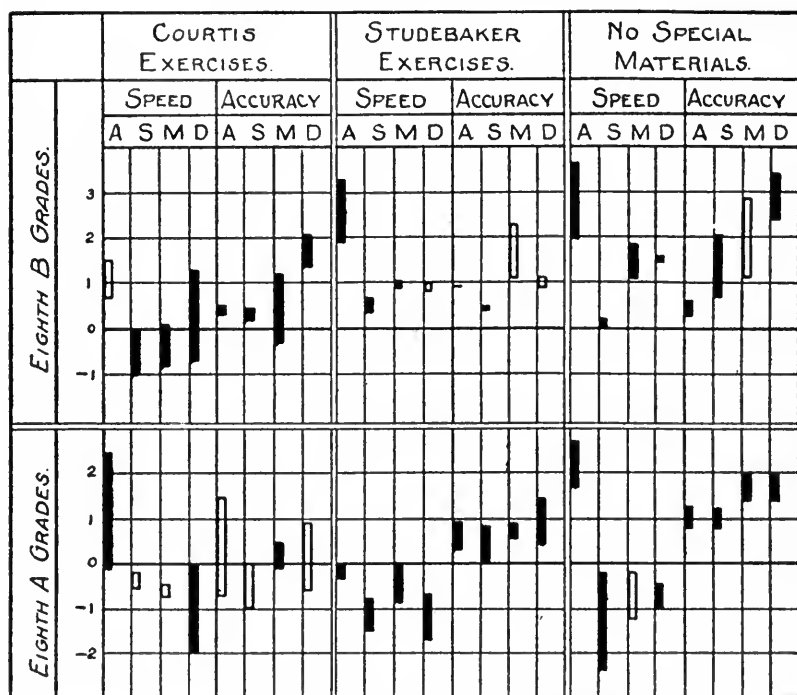


FIGURE 5. RESULTS OF DRILL IN THE EIGHTH GRADE. ZERO LINES INDICATE CITY MEDIANS; BARS SHOW GAINS IN CLASS MEDIANS; HOLLOW RECTANGLES SHOW LOSSES. ON THE ACCURACY SCALE 10 PERCENT IS SHOWN BY THE SAME DISTANCE AS 1 ON THE SPEED SCALE. DEVIATIONS ABOVE OR BELOW CITY MEDIANS RATHER THAN OBTAINED SCORES ARE SHOWN.

and on the average the Courtis material secured greater gains than the Studebaker.

6. Both the Courtis and the Studebaker material secured better adaptation of drill to individual child needs than did the ordinary schoolroom procedure; and it appears that on the whole the Studebaker material secured a little better adaptation than did the Courtis. It is possible that with longer periods devoted to the experiment and a chance to bring the classes and individuals more nearly to the standards contemplated in the directions for using the drill exercises, the adaptations to class and individual differences would appear stronger in the cases of both the Courtis and Studebaker groups.



# GEOGRAPHY TESTING IN BOSTON

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## EXTENT OF TESTING

The Department of Educational Investigation and Measurement has given geography tests in the Boston public schools twice: the first time in 1914 and the second time in 1919. The 1914 testing,<sup>1</sup> for which the questions were selected with great care, was mostly limited to the eighth grade. The tests in that year were given to fourteen eighth-grade classes, four third-year high-school classes, and to the freshman class in the normal school. The subject-matter of the tests was confined to a few of the most important countries of the world, viz., the United States and the countries of Europe. The results seemed to indicate a wide distribution of effort on the part of the teachers. As a means of directly improving the character of the instruction, the geography course of study was revised, minimum essentials were defined, and a more thorough course in geography was introduced into the curriculum of the Boston normal school.

The 1919 testing was more extensive. Its scope is indicated in Table I.

TABLE I. THE EXTENT OF THE 1919 TESTING

Grade	Number of Districts	Number of Classes	Number of Pupils
VIII	7	21	735
VII	7	26	915
VI	7	29	1,080
V	7	28	1,045
Total			3,775

<sup>1</sup> Reported in Bulletin No. V of the Department of Educational Investigation and Measurement.

The schools were chosen from different portions of the city, so that the group tested was representative of the entire system. Because there was such a marked indication in the results from grades VI and V of the influence of the language difficulty, this article will deal only with the results from grades VIII and VII.

The purpose of the 1919 testing was not only to measure any improvement that might be due to the revision of the geography course of study but also to compare results with the standards of the Hahn-Lackey Geography Scale and to get some light on the ability of children to reason from geographical data.

### THE 1919 TESTS FOR GRADES VIII AND VII

The test questions given in grades VIII and VII were as follows,<sup>2</sup> an outline map of the United States being printed at the head of the questions.

#### GRADE VIII

- |  | <i>Cities</i>                                   | <i>Products</i>                  |
|--|---|----------------------------------|
| 1. Locate on the map the cities named at the right.  | Minneapolis<br>Pittsburgh<br>Lowell             | .....<br>.....<br>.....          |
| 2. In the column marked "Products" write opposite the name of each city the name of a product for which the city is noted.   | New Orleans<br>Duluth<br>Galveston<br>Lynn      | .....<br>.....<br>.....<br>..... |
| 3. Locate New York City on the map.  |   |                                  |
| 4. (a) Name two important crops raised in southern United States.  |   |                                  |
| (b) Tell why these crops can be grown there.   |   |                                  |
| 5. Why is there so little rainfall in the states just east of the Rocky Mountains?   |   |                                  |
| 6. Below is given a list of articles which we use in our homes. Write below each word the name of the state in which that article is produced in large quantities. |   |                                  |
|  | <i>cotton oranges cane sugar rice coal iron</i> |                                  |
| 7. Give reasons for the growth of Minneapolis.   |   |                                  |
| 8. Why are the seaports of Russia not so important as the seaports of England?   |   |                                  |
| 9. Of what value to the countries of Europe are their colonies in other parts of the world?  |   |                                  |
| 10. Give reasons why the commerce of San Francisco is not so important as that of New York City.   |   |                                  |

<sup>2</sup> The questions as here presented are numbered for convenience and not as on the original test sheets. The same number always refers in this article to the same question whether or not that question occurs in more than one grade.

## GRADE VII

*(First five, same as grade eight)*

- a. Give two reasons why North Dakota is not as good a place to grow corn as Iowa.
- b. Name four outside possessions of the United States.
- c. Why is the Panama Canal an advantage to the United States in its trade with South America?
- d. Why is Pennsylvania so important in iron manufacturing?
- e. Name four industries based on animal products.

All of the questions of the eighth-grade test, except questions 4 and 5, were questions that had been given in the 1914 test. All the other questions in both grade VIII and grade VII including questions 4 and 5 were chosen from the Hahn-Lackey Geography Scale. Each question of the test was chosen because it was based on geographical facts that came in the geography course of study. Ten of the fifteen questions given were *reasoning* questions.

The scoring was done in accordance with the scoring of the 1914 geography test, where each question was arbitrarily assigned a value based on the number of parts into which the answers would naturally be divided. The questions chosen from the Hahn-Lackey scale were scored according to Professor Hahn's notes.

## SUMMARY OF RESULTS

Tables II and III present for each test as a whole and for each question: (a) the number of credits possible; (b) the median credits; and (c) the percent of accuracy.

It is apparent that while each of the tests as a whole is within the range of the pupil's ability, the questions vary greatly in difficulty. The results shown in this summary will be discussed in two groups: (1) a comparison of results in 1914 and 1919 on those questions of the Boston tests given in grade VIII both years; and (2) a discussion of the results attained on the questions chosen from the Hahn-Lackey scale.

TABLE II. RESULTS IN GRADE VIII AS OBTAINED IN 1919

Question	Possible Credits	Median Credits	Percent of Accuracy
1	7	5.9	68.1
2	7	6.4	77.2
3	1	1.0	58.4
4	5	3.2	53.6
5	1	1.0	60.6
6	6	4.7	65.6
7	4	1.4	24.4
8	4	1.2	19.2
9	5	1.6	24.3
10	3	1.2	24.4
Total Test	43	22.9	50.7

## COMPARATIVE ACHIEVEMENTS IN 1914 AND 1919

Questions 1, 2, and 3 were not only given to grade VIII in both years, but they were also given to grade VII in 1919. The 1914 percent of accuracy (grade VIII) on each of these questions was exceeded by the 1919 percent not only for grade VIII but also for grade VII. In other words the seventh-grade of 1919 beat the eighth grade of 1914.

TABLE III. RESULTS IN GRADE VII AS OBTAINED IN 1919

Question	Possible Credits	Median Credits	Percent of Accuracy
1	7	5.9	63.5
2	7	6.1	73.9
3	1	1.0	49.5
4	5	2.9	46.9
5	1	0.9	48.9
a	2	1.2	34.8
b	4	3.8	71.9
c	2	1.2	32.2
d	1	0.7	17.7
e	4	0.8	19.4
Total Test	34	19.6	53.8

TABLE IV. RESULTS ON QUESTION 1 (LOCATING SEVEN CITIES)

Grade	Year	Percent of Pupils Earning Each Amount of Credit								Median Credits	Percent of Accuracy
		0	1	2	3	4	5	6	7		
VIII	1914	7.2	6.1	6.1	10.4	16.7	20.5	21.4	11.6	5.2	61.2
VIII	1919	10.6	2.6	4.6	6.8	10.4	15.2	21.6	28.2	5.9	68.1
VII	1919	17.9	3.1	4.8	5.7	8.5	10.7	17.8	31.5	5.9	63.5

The first line of this table shows that when the question was given in grade VIII in 1914, 7.2 percent of the pupils earned no credit, that is, did not locate any of the cities correctly; 6.1 percent earned credit 1, that is, they located one of the seven cities correctly; 6.1 percent earned 2 credits, etc. The median amount of credit earned was 5.2 credits, while the percent of accuracy was 61.2. The second line shows the same facts for grade VIII in 1919, while the third line shows them for grade VII in 1919. The reading of Table V for question 2 is similar to that of Table IV for question 1.

TABLE V. RESULTS ON QUESTION 2 (PRODUCTS OF SEVEN CITIES)

Grade	Year	Percent of Pupils Earning Each Amount of Credit								Median Credits	Percent of Accuracy
		0	1	2	3	4	5	6	7		
VIII	1914	2.3	3.7	5.7	11.3	14.2	25.4	25.1	12.3	5.5	67.0
VIII	1919	1.6	2.3	4.0	7.1	11.7	14.8	21.8	36.7	6.4	77.2
VII	1919	1.4	2.5	5.5	8.6	11.6	18.8	23.4	28.2	6.1	73.9

TABLE VI. RESULTS ON QUESTION 3  
(LOCATION OF NEW YORK CITY)

Grade	Year	Percent of Accuracy <sup>1</sup>
VIII	1914	46.5
VIII	1919	58.4
VII	1919	49.5

<sup>1</sup>These percents are based on exact location.

The largest percents of error on question 1 were caused by failure to locate correctly Duluth and Minneapolis. Many who could locate a particular city in the correct state did not show its position on a body of water to which it owed its importance; for instance, more than a fifth of the eighth-grade pupils who located Galveston in the state of Texas did *not* locate it on the coast and about a sixth of those locating Duluth in Minnesota did not locate it on Lake Superior. Is it sufficient for the pupils to know merely the state in which a city is located when the growth and importance of that city are directly due to its position on coast or lake or river?

On the second question (the association of a product with each city) Duluth, Lowell, and Galveston were the cities on which pupils made the most errors, while Minneapolis seemed to be the best known.

One question keeps presenting itself to the mind of the person who scores the answers of such a geography test. It is this: "Should we not expect children to be specific in their answers?" For example, shouldn't children be expected to distinguish between raw cotton as a product of Galveston and cotton goods as a product of Lowell; between wheat and flour as products of Minneapolis; between coal and steel as products of Pittsburgh? Should we accept as an industry of Argentina the answer "wheat"? There is a large proportion of children who give such answers. Are they in the habit of giving such answers and of having them accepted? If that is so, then we are either failing to teach them to discriminate or else we are winking at a language difficulty by accepting it.

Again, when the children are asked to name one product and instead of doing so give a list of several products one or more of which may be correct, how is the teacher in the habit of dealing with this result? This practice on the part of pupils seems to be a fairly common one. Are they in the habit of giving such answers and of having the examiner pick out that which suits the case? In this test when a child gave such a list, he was given credit only if a majority of the products named were correct.

It will be seen that in 1919 only 58.4 percent of the eighth-grade children and less than half (49.5 percent) of the seventh-grade children could locate correctly New York City, the largest

and most important city of the western hemisphere. In addition, there were 13.5 percent in grade VIII and 15.4 percent in grade VII who located New York City in the interior of the state of New York. The remainder of the pupils showed no knowledge whatever of its location.

The other questions which were given to the eighth grade in both years were questions 6, 7, 8, 9, and 10. In 1919 there was a higher percent of accuracy for each question except the eighth. Table VII shows the comparison.

TABLE VII. RESULTS ON QUESTIONS 6, 7, 8, 9, AND 10. GRADE VIII

Question	Year	Percent of Pupils Earning Indicated Amount of Credit							Median Credits	Percent of Accuracy
		0	1	2	3	4	5	6		
6	1914	0.7	6.1	11.1	18.9	27.9	24.2	11.1	4.5	64.1
	1919	0.4	8.2	11.6	12.9	25.9	26.2	14.8	4.7	65.6
7	1914	43.6	37.5	16.8	2.1				1.2	19.3
	1919	31.7	45.6	16.4	5.9	0.4			1.4	24.4
8	1914	32.5	56.6	10.6	0.3				1.3	19.6
	1919	39.2	45.0	15.4	0.4				1.2	19.2
9	1914	22.1	51.8	18.4	7.2	0.5			1.5	22.5
	1919	16.6	52.0	25.6	4.8	1.0			1.6	24.3
10	1914	49.7	42.1	7.9	0.3				1.0	19.6
	1919	42.6	42.5	13.9	1.0				1.2	24.4

The differences, however, are not as great as they have been shown to be for questions 1, 2, and 3. The greatest increases, therefore, over the percents of 1914 are on the first three test questions—and it will be observed that they are fact questions. These large increases are probably due in large measure to the revision of the geography course of study which aimed at the definition of minimum essentials with concentration on a comparatively small number of important geographical facts.

The advantage over 1914 in the case of the thought questions is mainly due to a decrease in the group having complete failure.

Take question 7, for example. There were 37.5 percent in 1914 who could give only one factor contributing to the growth of Minneapolis; in 1919 this percent was increased to 45.6 while comparatively few in either year told more than one of the important factors contributing to the growth of that city.

Again, in question 8: "Why are the seaports of Russia not so important as those of England?" and in question 10, "Why is the commerce of San Francisco not so important as that of New York City?" very few pupils gave more than one reason.

The question has been raised as to how many reasons the children should be expected to give in answer to the general "Why?" Do they think they are fulfilling the requirements of the question when they give one reason? That does not seem to be generally true. They tell as many as they know.

#### ACHIEVEMENT ON HAHN-LACKEY QUESTIONS

Seven of the questions, 4, 5, a, b, c, d, and e, were chosen from the Hahn-Lackey Geography Scale. Each of the questions was chosen because the facts on which it was based formed part of the course of study of the specific grade or of an earlier grade.

Table VIII shows for each question the grade or grades in Boston in which it was used as a test question, the letter and number indicating its position on the Hahn-Lackey scale, the standard percent of achievement recommended by the scale, Boston's percent of achievement, the advantage in favor of Boston, and whether the question is a thought or a fact question.

It is noticeable that only in the case of the fact question does the Boston percent exceed that of the scale. Again, low percents on thought questions are noticeable. It is evident that standards in geography should be based on material that has been specifically included in the course of instruction, if we are to use them to judge the quality and result of instruction.

#### REASONING QUESTIONS

There are still large numbers of pupils who fail to give even one reason in answer to a thought question. This is particularly apparent in questions 8, 10, a, c, and e, where the percents of pupils who completely failed were 39.2, 42.6, 39.3, 37.9, and 59.6 respectively. This does not necessarily mean that we are



TABLE VIII. COMPARISON OF ACHIEVEMENT AT BOSTON WITH  
HAHN-LACKEY STANDARDS

Question Number	Grade	Scale Letter and Number	Hahn's Percent for Question	Boston's Percent of Achievement	Advantage in Favor of Boston	Thought or Fact Question
4	VIII	O 66	66	53.6	-12.4	both
	VII	O 66	66	46.9	-19.1	both
5	VIII	P 77	73	60.6	-12.4	thought
	VII	P 77	73	48.9	-24.1	thought
a	VII	L 116	42	34.8	- 7.2	thought
b	VII	N 208	58	71.9	+13.9	fact
c	VII	P 78	73	32.2	-40.8	thought
d	VII	J 137	27	17.7	- 9.3	thought
e	VII	K 181	34	19.4	-14.6	thought

expecting too much in the field of reasoning from geographical data. It may mean that the problem is not yet sufficiently recognized. However, we can certainly require as a minimum results equal to the median achievement on each question.

### THE SHORTENED FORM OF TEST

In many cases it will be desirable to use a shortened form of test as typified by the following form of questions 7, 10, and d.

7. *Give reasons for the growth of Minneapolis.* (Check 4)

1. Men from New England are going there and making it an important city.
2. It is the center of a great lumber region.
3. It is the center of a great wheat region.
4. Minneapolis is the largest city of Minnesota.
5. Minnesota is a larger state than Massachusetts.
6. St. Paul and Minneapolis are often called the twin cities.
7. The Mississippi River is navigable as far as Minneapolis.
8. The people of Minneapolis are prosperous.
9. St. Paul and Minneapolis together have a population of more than half a million.
10. Minneapolis is not a seaport.
11. There are many small lakes in Minnesota.
12. Minneapolis has fertile soil for agriculture.
13. Immigrants are flocking to Minneapolis.
14. It is a great railroad center.

15. The Great Lakes can be used for commerce.
16. The Falls of St. Anthony furnish water power for the mills of Minneapolis.
10. *Give reasons why the commerce of San Francisco is not so important as that of New York City.* (Check 3)
  1. San Francisco is farther from the countries of the Eastern Hemisphere than New York.
  2. The people of San Francisco are not so progressive.
  3. San Francisco is shut in by mountains more than New York.
  4. It is more expensive to send things from San Francisco.
  5. San Francisco has a smaller population than New York.
  6. Asia is not so important commercially as Europe.
  7. There are many Chinese in San Francisco.
  8. There is no city on the western coast that has such a good harbor as San Francisco.
  9. California is a great fruit-producing region.
- d. *Why is Pennsylvania so important in iron manufacturing?* (Check 1)
  1. There are mountains running through it.
  2. Pennsylvania has many rivers.
  3. It manufactures more than any other state.
  4. It is a railroad center.
  5. Pennsylvania has a dense population.
  6. There are many different things mined in Pennsylvania.
  7. Iron is found there and coal is easily obtained.

Such a test eliminates the language difficulty, simplifies the correction of results, and saves time in writing. It may be used when the object is simply to get a measure of the ability of an individual or group, as investigation seems to show that the reliability of the scores is just as great.

#### THE VALUE OF THE USUAL TYPE OF TEST

However, the usual type of question—the type used in this testing—has values which the shorter type illustrated above for questions 7, 10, and d does not have. The child's wrong answers give us valuable knowledge as to his understanding of certain facts and as to his reasoning from them. We are thus able to correct wrong impressions. Too often, in our contemplation of right answers, we disregard the significance of wrong answers. Take, for instance, the question: "Why is there so little rainfall in the states just east of the Rocky Mountains?" Only 61 per cent in grade VIII and only 49 percent in grade VII showed any

knowledge of the *real* cause. Of those who hadn't any knowledge of the real cause this is the type of answer given.

The mountains keep the rain absorbed on their tops and it doesn't fall much.

The mountains are so high that the rain doesn't get a chance to land on the ground.

The mountains are high and the cloud hits them and knocks off rain.

The mountains support the states.

The wind blows the rain on the other direction and it slides down the mountain.

Here is seen an absolutely wrong conception of the effect of mountains on rainfall. Then again, in answer to the question "Give reasons for the growth of Minneapolis," these are given: "When seaports are open they get frozen," "Men from New England are going to Minneapolis and making it an important city." It is true that the new type of examination gives us a reliable index of the percent who have attained accuracy and that it requires relatively little labor in scoring results. Yet after all one of the chief values of the traditional type of test—and one that is being so often overlooked—is the opportunity it offers to make effective use of the child's answers to questions.

Among the important facts brought to light then as a result of the geography testing in Boston are these:

1. The definition of minimum essentials in geography brings a higher percent of accuracy in results on fact questions.

2. Inasmuch as the eighth-grade test ranged from a question on which the pupils achieved an accuracy of 77 percent to one on which they achieved an accuracy of 19 percent, it shows that the test as a whole is within the ability of eighth-grade pupils. The range on the seventh-grade test was practically the same.

3. Any geography standard which is designed to be used as a basis for evaluating the results of geography instruction should be based upon subject-matter *taught*. Otherwise it is based upon general knowledge and becomes useless as a basis of comparison just as soon as the material has been taught.

4. It does not seem sufficient for pupils to know the state in which a city is located when the growth and importance of the city are directly due to its position with reference to physical features.

5. Many children do not distinguish between raw and manufactured products, nor between products and industries. This is either a language difficulty or a lack of discrimination which is not recognized.

6. Thought questions are almost always more difficult than fact or location questions. There is no standard as to what we should expect in the ability to reason from geographical data but at least we should expect results equal to the median achievement of the pupils in the Boston test.

7. If a test is to be used to measure the ability of an individual or a group on one or more questions the shortened form of examination is useful. While there are difficulties in its construction, it is far simpler to administer.

8. While the traditional type of test (as used here) does give a measure of ability, its scoring is subjective. There is danger in establishing standards based on such a test unless this is clearly recognized. Definite statements as to accepted answers to each question should be made available by those on whose judgments the standards were set up.

9. One of the chief values of this kind of test lies in its disclosure of the child's understanding of certain facts and his reasoning from them. There is a wealth of material here which is too often disregarded. Our clearer understanding of the reasoning problem in geography will come through this analysis.

# THE CLASSIFICATION OF SCHOOL CHILDREN ACCORDING TO MENTAL AGE

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*Ohio State University*

The increasing realization of the necessity for more uniform grouping of children according to mental age rather than according to chronological age has already resulted in some experimental work. It may therefore be helpful to describe the experience we have had in this connection with one school during the past year. The opportunity afforded us was due to the cooperation of the principal, Mrs. Scatterday, who has for a long time been interested in psychological tests and who has used the results of such tests with rare ability and discrimination. We wish here to tender our thanks for her constant help and deep interest.

The Northwood School of Columbus, Ohio, in which the work was done, is a public elementary school in a very good section of the city. It has an enrollment of about five hundred pupils and contains only grades I to VI. All the children in grades I to V were tested during the first semester of 1919-1920. Those in grade VI were not tested because they would shortly enter the junior high school. The Stanford Revision of the Binet Scale was used throughout. Grades II to V were tested under the direction of the writers, and grade I under the direction of Doctor J. E. Evans of the Ohio State University, to whom the writers are indebted for the opportunity of using his results.

## THE RESULTS OF THE TESTS

Table I shows the actual distribution in the five grades as shown by the tests. The rows show mental age while the columns show grades. The zig-zag lines inclose the entries of pupils of normal mental age, allowing one and one-half years for each half grade. The mental age of 6-6 to 6-11 may be considered normal for the IB grade,<sup>1</sup> because a child usually enters school between the ages of 6 and 7. Mental age of 7-0 to 7-5 is typical of the IA, as ordinarily children have been promoted from IB by

<sup>1</sup> "B" indicates the lower half and "A" the upper half of a yearly grade. In writing ages, 6-11 means 6 years, 11 months and similarly for other expressions of the same kind.

TABLE I. ACTUAL DISTRIBUTION OF PUPILS BY MENTAL AGE AND GRADE AT THE TIME OF TESTING

Mental Age	GRADE										Total
	IB	IA	IIB	IIA	IIIB	IIIA	IVB	IVA	VB	VA	
4-0 to 4-5.....	1										1
4-6 to 4-11.....	3										3
5-0 to 5-5.....	1										1
5-6 to 5-11.....	7										7
6-0 to 6-5.....	11	2	1								14
6-6 to 6-11.....	18		4		1		1				24
7-0 to 7-5.....	22	5	10	4	1						42
7-6 to 7-11.....	15	3	7	4	8	1					38
8-0 to 8-5.....	3	1	15	4	15	4	1				43
8-6 to 8-11.....		2	8	8	16	8	4	2	6	1	55
9-0 to 9-5.....			6	5	5	6	12	5	6	1	46
9-6 to 9-11.....		1	4	2	2	6	15	5	4	2	41
10-0 to 10-5.....					1	4	12	2	5	6	30
10-6 to 10-11.....					2	5	7	7	8	4	33
11-0 to 11-5.....							5	6	6	7	24
11-6 to 11-11.....						1	5	2	4	3	15
12-0 to 12-5.....							1	5	2	5	13
12-6 to 12-11.....						1	1		5	3	10
13-0 to 13-5.....									2	1	3
13-6 to 13-11.....										1	1
14-0 to 14-5.....									2	1	3
Over 14-6.....								1		2	3
Total.....	81	14	55	27	51	36	64	35	50	37	450

the age of 7. Similarly, six months may be allowed for each half grade. This range of six months for each half grade is, however, rather narrow; and a school judged by displacements outside of this narrow range shows a very large percentage of displacements. We have, therefore, indicated a wider range by means of the zig-zag lines. This range allows one and one-half years for each half grade. Thus, 1B reaches from 6-0 to 7-5, and 1A from 6-6 to 7-11, and so forth. The table is to be read as follows, beginning at the upper left-hand corner: One pupil having a mental age between 4-0 and 4-5 is found in 1B; of those having mental ages from 4-6 to 4-11 three are found in 1B, and so forth. At the extreme right is the total number of cases at each mental age, and at the foot is the total number in each grade.

Allowing one and one-half years to each half grade, 27.6 percent of the pupils were classified as below normal. These pupils were in grades below those to which, according to their mentality, they should have belonged. On the same basis, 55.3 percent of the pupils were normal, and 17.1 percent were above their normal grades. Since more than one-fourth of the children are bright enough to be in higher grades, there is evidently large wastage of good mental material—a wastage such as we always find in schools made up of children of good mental ability.

According to Table I, 77 pupils, or 17.1 percent, are above normal; 249, or 55.3 percent, are normal; and 124, or 27.6 percent, are below normal.

### THE LEVEL OF INTELLIGENCE

That this school has more than the average number of bright and superior children can be seen from Table II, which shows the distribution according to Intelligence Quotients of the 450 cases. Table II may be read as follows, beginning at the upper left-hand corner: Of feeble-minded children—i.e., of those having intelligence quotients between 0 and 69—one was found in 1B, one in 1IA, one in 1VB, etc. The total number of children of this level of intelligence was 7, or 1.6 percent of the entire number tested. The last column shows the percents for each group. The distribution is skewed decidedly toward the superior group and shows that the mental make-up of the children is, in general, above normal. We note that the normal group contains almost

50 percent. The bright group contains 21 percent in comparison with only 11 percent in the backward group. The very bright group contains 8 percent as compared with the 4 percent in the borderline group, and the very superior group contains over 4 percent as compared with less than 2 percent in the feeble-minded group.

TABLE II. GRADE DISTRIBUTION OF PUPILS ACCORDING TO INTELLIGENCE QUOTIENTS

Diagnosis	Intelligence Quotients	GRADE										Total	Percent
		IB	IA	IIB	IIA	IIIB	IIIA	IVB	IVA	VB	VA		
Feeble-minded	0—69	1	...	...	1	...	...	1	...	1	3	7	1.6
Borderline...	70—79	3	...	2	2	3	...	1	2	3	3	19	4.2
Backward...	80—89	5	1	5	1	7	4	3	4	11	8	49	10.9
Normal....	90—109	33	11	27	15	30	14	35	19	25	14	223	49.6
Bright.....	110—119	30	1	12	5	8	9	13	4	7	5	94	20.9
Very bright..	120—129	9	...	4	3	2	5	8	4	2	1	38	8.4
Very superior	130—	...	1	5	...	1	4	3	2	1	3	20	4.4
Total.....		81	14	55	27	51	36	64	35	50	37	450	100.0

### THE RECLASSIFICATION

The results of the tests were used in determining the promotions at the beginning of the second semester in February, 1920. Because of having high mental ages and intelligence quotients, 47 pupils were given an extra promotion of a half grade—that is, a half grade more than the promotion which would have normally occurred at this time. Twenty-two were given an extra promotion of a whole grade. In regard to intelligence quotients, these cases were distributed as shown in Table III.



TABLE III. DISTRIBUTION ACCORDING TO INTELLIGENCE QUOTIENTS OF PUPILS RECEIVING EXTRA PROMOTION

Intelligence Quotients	No. of Cases	No. Promoted an Extra Half Grade	No. Promoted an Extra Whole Grade
90- 99	1	1	.....
100-109	10	4	6
110-119	20	17	3
120-129	22	16	6
130-139	10	7	3
140-149	5	2	3
150-159	1	.....	1
Total.....	69	47	22

Because of low mental ages and intelligence quotients, six pupils were demoted a half grade, and one was demoted a whole grade. That is, these pupils were demoted that much below their former grade. They had mental ages and intelligence quotients, and were demoted as indicated in Table IV.

TABLE IV. MENTAL AGES AND INTELLIGENCE QUOTIENTS OF DEMOTED PUPILS

Mental Age	Intelligence Quotient	Grade	Grade to Which Demoted
8-10	91	IVA	IVB
9-2	84	IVA	IVB
8-2	91	IIIA	IIIB
6-4	79	IIB	IA
6-8	84	IIB	IA
7-0	93	IIB	IA
7-3	90	IIIB	IIB

Because of rather low mental ages and intelligence quotients and unsatisfactory work, 41 pupils were retained in their former grade. They were distributed according to their intelligence quotients as shown in Table V.

TABLE V. DISTRIBUTION OF PUPILS NOT PROMOTED

Intelligence Quotients	Number of Pupils
80- 89	16
90- 99	21
100-109	4
Total. . . . .	41

In order to help the pupils cover the extra work involved in their rapid promotion, a special teacher devoted full time to tutoring. Two types of tutoring classes were organized. Before the end of the first semester, where it was possible to predict the extra promotion, the pupils were given work in advance of their grade, in addition to their regular work, the aim being to prepare them to take up the work in the new grade into which they would be promoted. After the general shifting at the beginning of the second semester and the pupils were in their new grades, they were tutored on the work between their old and new grades. After having had experience with both methods of tutoring, the teacher gave it as her opinion that the before-promotion tutoring was most successful in studies depending on preceding work in the same subject, as in arithmetic. She considered the after-promotion method satisfactory in studies not depending on preceding work, as geography.

Two classes were formed for especially bright children, one in the IA grade, the other in the IIA grade. The special class in the IA grade was created in order to assemble children of the same mental caliber. It contained 28 pupils of regular IA promotion with intelligence quotients ranging from 110 to 128. Eight others in the class either had not been promoted from, or had been demoted into that grade. The intelligence-quotient distribution of the pupils in this special IA class is given in Table VI.

In the *regular* IA grade pupils having intelligence quotients from 90 to 110 were put in a class by themselves and given regular IA work. Those having intelligence quotients below 90 were put into the IB grade.

TABLE VI. DISTRIBUTION OF PUPILS IN THE SPECIAL IA CLASS

INTELLIGENCE QUOTIENTS	NUMBER OF PUPILS	
	Promoted	Retained or Demoted
70- 79	0	1
80- 89	0	4
90- 99	0	3
100-109	0	0
110-119	20	0
120-129	8	0
Total.....	28	8

The special class in the IIA grade consisted of 23 pupils having intelligence quotients from 110 to 135. Twenty of these would have been in the IIA grade by normal promotion, while three would have been in the IIB. In collecting this group of bright children in IIA instead of giving them extra promotion, the aim was to broaden their education as well as to allow them to progress faster. In arithmetic they were to be drilled in accuracy; and in language they were to be given much oral work to broaden their vocabulary and to enable them to talk fluently.

An ungraded class was formed in which 16 pupils with low intelligence quotients were given individual teaching. These pupils were collected from the various grades, and each one was given special care. Their distribution according to intelligence quotients is given in Table VII.

TABLE VII. DISTRIBUTION OF PUPILS IN THE UNGRADED CLASS

Intelligence Quotients	Number of Pupils
0-59	1
60-69	3
70-79	10
80-89	1
90-99	1
Total.....	16

## EXTRA PROMOTION

As we have stated above, 69 children were given extra promotions of a half or whole grade. All of these cases were carefully studied by Miss Vogt, the coaching teacher, who gave them extra work for varying periods until they had made an adequate adjustment to their new classes. Much of the ultimate success of this experiment was due to the interest and understanding displayed by the coaching teacher, and we can not emphasize too strongly the need for this type of constructive teaching after the psychological tests have pointed out the discrepancies in the placement of the children. The coaching work was regarded as a privilege by the pupils and not as an extra burden, and this must, of course, always be the case if the work is to prove successful.

Careful notes were kept by the coaching teacher. Some of the remarks are interesting enough to be given here:

E. A.—Chron. Age 11-2. M. A. 14-3. I. Q. 128. Promoted from VB (Sept.) to VIA (May). In May he stands highest in his class. He has rapidly matured since his rapid promotion and has risen fully to his opportunities.

V. T.—Chron. Age 10-11. M. A. 16-3. I. Q. 148. Promoted from VA (Sept.) to VIA (May). Her school days would hardly total two full years, due partly to physical weakness and partly to a mother with radical ideas. Covered decimals in only two or three coaching lessons. Especially bright in English. After having skipped a half grade, she was out of school two months, yet enters class and gets "Excellent" in all her grades.

M. L.—Chron. Age 9-8. M. A. 12-6. I. Q. 128. Promoted from VB (Sept.) to VIB (May). Former teachers predicted failure because she never showed any interest in school work. The double promotion seemed to stimulate the girl to take some interest in her work. "Her weak grasp of a piece of crayon changed to reliant firmness."

G. C.—Chron. Age 8-3. M. A. 11-10. I. Q. 145. Promoted from IIIA (Sept.) to VB (May). No one suspected her ability but she has surprised everyone by making good.

L. E.—Chron. Age 11-7. M. A. 12-7. I. Q. 109. Promoted from VB (Sept.) to VIB (May). Apparently of a light nature, not given to hard work, but shows improvement in interest. Disappointed his teachers. "Still have hopes that the skipping will be of benefit eventually."

R. T.—Chron. Age 11-3. M. A. 12-5. I. Q. 110. Promoted from VB (Sept.) to VIB (May). Not up to the rest of the class in arithmetic, but responds to personal teaching. Later the teacher said of him that he was mischievous and had disappointed his teachers.

I. A.—Chron. Age 8-2. M. A. 10-10. I. Q. 133. Promoted from IIIB (Sept.) to IVA (May). Does not live up to his privileges. Is slow in reading and arithmetic.

These are samples of the best and poorest records of the children given extra promotion. Only two children, according to the principal, failed to make good, and we are positive that the very few disappointments experienced in this respect were due to the careful selection of cases in the first place by means of accurate mental tests.

#### SURVEY OF THE SCHOOL AFTER RECLASSIFICATION

Let us now compare the school as a whole at the time of testing with the condition on May first, after the reclassification had been made and after it had become more or less permanent. Table VIII shows the actual distribution of 370 pupils at the time of testing. These 370 pupils are those of the original 450 who were tested during the first semester and who were still in school and in grades IA to VI B inclusive on the first of May. The remaining 80 do not appear for the following reasons: (1) removal; (2) classified in the ungraded individual class; or (3) found in the IB or VIA grades on the first of May. According to this table, 13 percent are classified above their normal grade, 56.7 percent are in their normal grade, and 30.3 percent are below their normal grade.

Table IX shows the actual distribution on May first of the 370 pupils who appear in Table VIII. The IB and VIA grades do not appear in this table since at that time there were a number of pupils in these grades who had not been tested. In Table IX the pupils are classified, not according to the mental ages found when they were tested, but according to their mental ages on May first as estimated from their intelligence quotients. For instance, suppose a pupil had a mental age of nine and an intelligence quotient of 115 at the time he was tested, say the last of October, chronologically, he would be six months older by the first of May. But assuming that he had been maturing mentally according to his intelligence quotient, his new mental age would exceed his former mental age by almost seven months. He would therefore appear in Table IX as having a mental age of 9-7. Similarly, if another pupil had a mental age of 9 and an intelligence quotient of 80 when tested the first of January, his increase in chronological age would be four months. His new mental age, however, would be  $9 \text{ years} + 0.80 \times 4 \text{ mo.}$  or a little over 9-3

TABLE VIII. DISTRIBUTION OF 370 PUPILS BY MENTAL AGE AND GRADE AT THE TIME OF TESTING

Mental Age	GRADE										Total
	IB	IA	IIB	IIA	IIIB	IIIA	IVB	IVA	VB	VA	
5-6 to 5-11.....	4										4
6-0 to 6-5.....	9	2	1								12
6-6 to 6-11.....	15		3								18
7-0 to 7-5.....	15	5	10	2							32
7-6 to 7-11.....	14	3	6	4	5	1					33
8-0 to 8-5.....	2	1	15	3	10	3	1				35
8-6 to 8-11.....		2	8	6	6	7	3	1	3		36
9-0 to 9-5.....			6	4	3	6	8	3	5		35
9-6 to 9-11.....		1	4	2	2	6	16	5	3	2	41
10-0 to 10-5.....					1	4	12	3	5	6	31
10-6 to 10-11.....					2	5	6	5	8	4	30
11-0 to 11-5.....							5	5	6	6	22
11-6 to 11-11.....						1	4	2	4	3	14
12-0 to 12-5.....							2	5	2	5	14
12-6 to 12-11.....						1	1		4	3	9
13-0 to 13-5.....									2		2
13-6 to 13-11.....											
14-0 to 14-5.....									1		1
Over 14-6.....								1			1
Total.....	59	14	53	21	29	34	58	30	43	29	370

Above normal: 48 pupils or 13 percent.

Normal: 210 pupils or 56.7 percent.

Below normal: 112 pupils or 30.2 percent.

TABLE IX. DISTRIBUTION OF 370 PUPILS BY MENTAL AGE AND GRADE AFTER CLASSIFICATION

Mental Age	GRADE										Total
	IA	IIB	IIA	IIIB	IIIA	IVB	IVA	VB	VA	VIB	
6-0 to 6-5.....	7										7
6-6 to 6-11.....	11	1									12
7-0 to 7-5.....	16	9	1								26
7-6 to 7-11.....	16	3	7	5							31
8-0 to 8-5.....	12	2	7	6	1	2					30
8-6 to 8-11.....	2		16	10	8	5					41
9-0 to 9-5.....			4	3	7	10		3	2		29
9-6 to 9-11.....			3	2	5	9	5	5	2	1	32
10-0 to 10-5.....			5		2	9	14	6	4	2	42
10-6 to 10-11.....							14	3	5	6	28
11-0 to 11-5.....						1	10	10	6	6	33
11-6 to 11-11.....							1	8	7	3	19
12-0 to 12-5.....								1	11	5	17
12-6 to 12-11.....								2	3	4	9
13-0 to 13-5.....								1	1	7	9
13-6 to 13-11.....								1	1	1	3
14-0 to 14-5.....											
Over 14-6.....										2	2
Total.....	64	15	43	26	23	36	44	40	42	37	370

Above normal: 47 pupils or 12.7 percent.

Normal: 238 pupils or 64.3 percent.

Below normal: 85 pupils or 23 percent.

years. He would appear in the table with a mental age of 9-3. All this is based upon the assumption that the I. Q. remains constant. This is not absolutely true, but it is the best present working hypothesis for practical work.

According to Table IX, 12.7 percent are above their normal grade, 64.3 percent are in their normal grade, and 23 percent are below their normal grade. The comparison with Table VIII is shown in the following table and in Figure 1.

	Above Normal	Normal	Below Normal
First semester (Table VIII).....	13.0	56.7	30.2
Second semester (Table IX).....	12.7	64.3	23.0

It will be noticed that in Tables VIII and IX the percents of pupils above their normal grade are almost equal, Table IX showing a decrease of 0.3 percent. Small as it is, this difference is in the right direction. Table IX shows an increase of 7.6 percent of pupils normally placed, and a decrease of 7.2 percent of those below normal—in both respects an improvement over the percents of Table VIII.

Several reasons prevented a still greater improvement. In the first place, there are factors other than mental ages and intelligence quotients which must enter into the problem of promotion. In the second place, peculiarities in the conduct of the experiment operated to reduce the appearance of improvement. For example, it will be noticed that in Table IX most pupils who are classified as below normal are in the upper grades—i.e., from IVA to VIB inclusive. This is because at the beginning of the second semester, the pupils were put into grades according to their mental ages at the time they were tested, while Table IX was constructed according to their mental ages on the first of May. Suppose, for instance, that a child, tested the first of November, had at that time a mental age of 9-11 and an intelligence quotient of 125. His estimated mental age May first would then be 10-6, i.e.,  $9-11 + (1.25 \times 6 \text{ mo.})$ . Nevertheless, he would have been placed at the beginning of the second semester in a grade according to his former mental age of 9-11. Clearly, this grade would be unduly low. This



element enters especially into the upper grades, since they were tested for the most part during the earlier months of the first semester. The reason for the retardation in grades IA and IIA is the fact that a number of pupils with high mental ages were retained in the special classes in these grades.

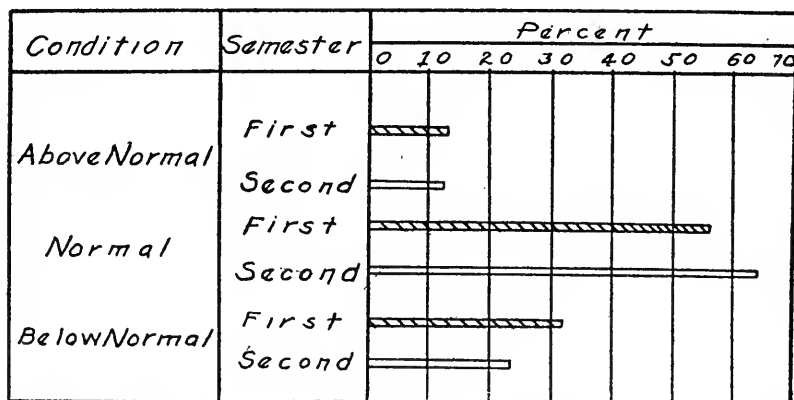


FIGURE 1. COMPARISON OF CONDITIONS IN THE FIRST SEMESTER AND IN THE SECOND SEMESTER

Twenty-five pupils were retained in the special classes in grades IA and IIA, although their mental ages were high enough to warrant more rapid promotion. The reason for retaining in the IA grade the first-grade pupils with high mental ages was that they must know how to read before being given rapid promotion to the higher grades. In the special IIA class the pupils are being given special training, part of it being IIIB work, so that although they appear in the tables as being retarded in the IIA grade, they are really doing more advanced work. In the IA grade it will be noted that there are 14 pupils classified in Table IX as too old mentally for that grade. Of these 14 pupils, 13 are in the special IA class. In the IIA grade it will be noted that 12 pupils are represented as too old for the grade. All of these pupils are in the special IIA class. If these 25 children were normally placed, the total would be 370 pupils distributed as follows: above normal 47, or 12.7 percent; normal 263, or 71 percent; below normal 60, or 16.2 percent.

This last distribution represents practically what has been achieved by the mental examinations and should therefore be compared with the original distributions given in Table VIII. The following table and Figure 2 give the comparison.

	Above Normal	Normal	Below Normal
Original distribution.....	13.0	56.7	30.2
Final distribution.....	12.7	71.0	16.2

This shows a shift of more than 14 percent towards the ideal and represents a large gain in the correct placement of pupils. Little improvement is noted in those above normal, because the school is naturally reluctant to demote pupils. A gain at this end of the distribution will come in time if the policy outlined in this article is adhered to. A great gain has been effected in those below their normal grade, cutting the number of misplacements practically in half. If the school pursues this method of classification systematically for several years, the amount of displacement will unquestionably be still further decreased.

#### GENERAL REMARKS

The assistant superintendent of schools, after visiting the school, expressed himself as well pleased with the condition of the classes, especially with the uniformity of work being done in each room and the evenness with which the children accepted instruction and responded. He said that he considered it one of the best pieces of work accomplished in the city.

In speaking of the condition of the school in May, the principal declared that it was infinitely better than before the testing was done. She said that the teachers' attitude toward the children was greatly changed for the better. Formerly, a certain contempt had been felt for the dull child, but this had given way to an insight never present before and an infinite patience. She observed that the shifting according to mental ages had nearly eliminated the problem of discipline. Troublesome pupils had been of two kinds: either those for whom the work was too hard and who, finding they could not master it, turned their energy

into other channels; or those for whom the work was too easy and who, being bored, had sought more interesting activities. The shifting had practically eliminated the troublesome child by giving him work more suited to his ability. The principal said further that it had caused teachers to cooperate better with each other, and to exercise a keener insight into the individuality of pupils; that if pupils did not accomplish what their mentality indicated they ought to accomplish, the teachers were quicker to give them special attention in an effort to find out why they were not living up to their abilities.

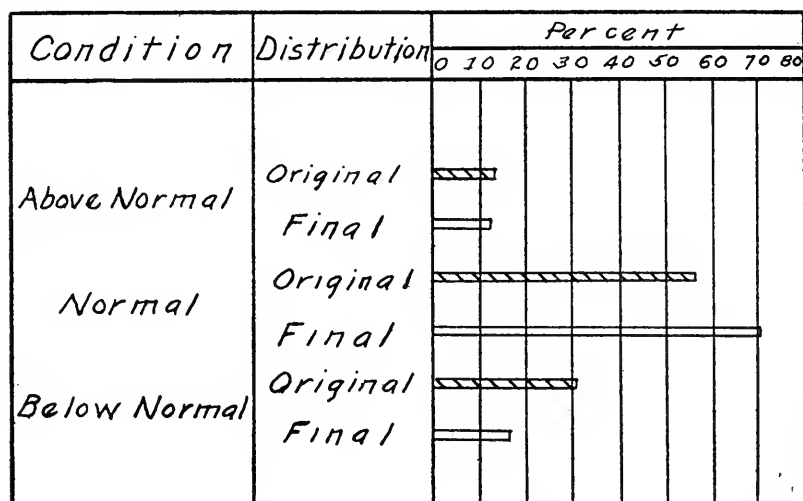


FIGURE 2. COMPARISON OF CONDITIONS IN THE FIRST SEMESTER (ORIGINAL DISTRIBUTION) WITH CONDITIONS ARISING WHEN CHILDREN IN SPECIAL CLASSES ARE REGARDED AS NORMALLY PLACED (FINAL DISTRIBUTION)

She considered the special classes a great success. She spoke especially of the work done in the individual class where each child received training suitable to his low mental age and intelligence quotient. It was her opinion that the children of this class would have derived almost no benefit from the regular grades, but that with individual training they were acquiring much practical education, especially along the lines of industry and hygiene.

The teacher of the special IIA class believed that without exception her pupils could easily have accomplished both the IIA and the IIIB grade work. She had given them some IIIB grade work and was planning to give them some more. They were quick to grasp principles and required little drill. She gave an example from their work in arithmetic. On a certain occasion they had been adding two-column numbers with success. Without warning she gave them four-column numbers to add. No pupil halted or asked a question, but all of them solved the examples correctly from their knowledge of two-column numbers. She also said that they read without difficulty a book which was used as supplementary reading in the fourth grade.

The tutoring teacher indicated that in her work with the pupils who had been given extra promotions, she had found but two who were not able to do the work expected from them. The principal, in speaking of these pupils, said that they were the only exceptions in the whole school; but that since they had been tutored only two months, they might yet do satisfactory work.

#### SUMMARY

In this school efforts were made towards a classification of pupils according to mentality. A certain number were given extra promotion, and a few were demoted. A tutoring class, two classes for bright children, and an ungraded class were organized. All except two of the pupils who received extra promotion have justified their advancement. Conditions before and after these efforts were made have revealed a marked increase in the number of children in grades corresponding to their mental abilities.

Reports of the assistant superintendent, principal, and teachers all show great satisfaction. They stress the superiority of the school work accomplished, the splendid effect on discipline and the increased interest which the teachers show in the pupils.

The reclassification on the basis of mental age has justified itself in more ways than had been imagined before the experiment was begun. It is thoroughly practicable and will eliminate a great deal of the present-day waste and inefficiency in the ordinary school system.

## USING STANDARDIZED TESTS IN RURAL SCHOOLS FOR GRADING PURPOSES<sup>1</sup>

SAMUEL S. BROOKS

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In my last article I explained how the cooperation of teachers was secured in the use of standardized tests and how the teachers were instructed as to the manner of giving and scoring them. The article concluded with an account of the distribution of the tests with directions that they were to be used at once in the schools. These schools, as I have indicated, were not graded. Indeed, it was the immediate purpose of this preliminary test to secure a satisfactory basis for grading them.

During the ten days allotted to the teachers for giving, scoring, and returning the tests, I visited as many schools as possible, giving advice and help where it appeared to be most needed. Considerable time and labor were thus saved in the later tabulation of results. Moreover, this plan enabled me afterwards to avoid much of the delay incident to the repetition of tests found on examination to have been carelessly or improperly given.

Even so, it was not all smooth sailing. In spite of preliminary precautions to insure accurate results in the shortest possible time, a number of tests had to be repeated before I could feel sure that the results were fairly accurate. The returns of two or three teachers indicated such gross carelessness or incompetence or both that I was obliged to repeat the tests in their schools myself. But since the purpose of this paper is to show how the results of these tests were used for grading purposes, I shall confine myself to that topic.

The first step was to mark each paper with the grade corresponding to the score recorded on it by the teacher. For instance one pupil's score on Woody's Multiplication Scale was 15. Since 15 is the standard score for grade VI, this paper was marked "VI." Another pupil's score on the same scale was 16. Since 15 is the standard score for grade VI and 17 is the standard score for grade VII, this paper was marked "VI½." On Courtis' Silent Reading

<sup>1</sup> This is the third article by Superintendent Brooks on the general topic "Putting Standardized Tests to Practical Use in Rural Schools."

Test a certain pupil received the following scores: words read per minute, 140; questions answered in five minutes, 38; index of comprehension, 94. The standard scores for grades II-VI are given as follows:

	II	III	IV	V	VI
Words per minute . . . . .	84	113	145	168	191
Questions in five minutes . . . . .	16	24	30	37	40
Index of comprehension . . . . .	59	78	89	93	95

Hence the grades marked on the paper were, for words per minute, IV; for questions answered in five minutes, V $\frac{1}{3}$ ; for index of comprehension, V $\frac{1}{2}$ .

If teachers are instructed to keep all the tests of one kind together rather than all the tests of one pupil this task of grading the papers is not interminable. As the teachers correct the papers they should mark the score plainly on the front page. Then the superintendent may compare these scores with the standard scores and grade the papers correspondingly. About two days sufficed to mark the approximately two thousand papers from all the schools. The work was considerably facilitated by having on a single sheet of cardboard the tables of standard scores for all the tests. Working at a large table with this sheet propped up in front of me, I could after a little practice ascertain at a glance the grade corresponding to any score. The advantage of such a procedure will soon become obvious to any one who attempts to mark a large number of papers with the standard scores scattered in a dozen different books and pamphlets. (By way of an aside, I wonder why all the authors of tests do not print the standard scores on the front page. It would save a lot of time for the people who use the tests.)

Next came the harder task of devising a method of recording results which would meet four conditions: (1) be in a form readily available for grading purposes; (2) be concrete and graphic enough to be clearly understood by teachers, pupils, and parents; (3) show on a single form small enough to be conveniently filed the standing of a pupil, a class, or a school in all subjects of the course of study for which standardized tests are available; (4) be in a form that could be used as the beginning of a continuous record to measure progress of pupils and ability of teachers.

The class record sheets and graph sheets accompanying several of the tests were carefully studied with a view to adapting them to the purpose in hand. I soon decided, however, that they were too complicated and time-consuming for practical use by the rural superintendent who must do all his own tabulating of results or have it done by untrained teachers. Certainly such record and graph sheets would not meet any of the last three conditions mentioned above. They could not be easily understood by pupils and parents. There would be as many sheets as there were subjects; and several files instead of one would therefore be required. Furthermore, such sheets do not accompany all the tests, and only two or three tests make any provision for keeping permanent records of the scores of individual pupils. Some sort of simple graphic representation that would include all the tests on a single small sheet was absolutely necessary if the scheme was to be simple enough for practical use.

After considerable experimenting during which some of the graphs evolved resembled nothing so much as a lost trail in the desert, I finally adopted the following plan as both simple and practical. I ruled several  $5 \times 8$  cards in copying ink with vertical and horizontal lines as shown in Figure 1. The vertical lines were numbered at the top to represent subjects and phases of subjects in which tests had been given. The horizontal lines were numbered with Roman numerals to represent the eight grades of the elementary school. From these originals nearly four hundred hektograph copies were made—enough for all the pupils in my schools above the first grade.

With these forms in hand and with the papers properly graded it did not take very long to construct a graph for each individual pupil. Figure 1 is a copy of an actual record on file in my office. It is the graph of L. D., an 11-year-old boy in the village school, Tamworth, N. H. Table I shows the same data including the subjects and phases of subjects corresponding to the numbers of the vertical lines of Figure 1. L. D.'s grade for each test is shown in Table I in the right-hand column opposite the name of the test. In constructing the graph a heavy dot was placed at the intersection of vertical line no. 1 with grade line no. III to indicate third-grade ability in rate of silent reading; another dot at the intersection of vertical line no. 2 with grade

TABLE I. RECORD OF L. D.

(See also Figure 1)

No.	Subjects and Phases of Subjects	Grade
1	Rate of silent reading: Courtis' Test.....	III
2	Writing speed.....	VII
3	Writing quality.....	III
4	Questions answered in five minutes: Courtis' Test.....	VII
5	Index of comprehension: Courtis' Test.....	VII
6	Spelling.....	III
7	Addition.....	IV
8	Subtraction.....	V
9	Multiplication.....	V½
10	Division.....	VI
11	Mixed fundamentals.....	V
12	Arithmetical reasoning: correct principle.....	IV
13	Arithmetical reasoning: correct answer.....	IV
14	Visual vocabulary.....	VI
15	English organization.....	V
16	Geography.....	IV½
17	History.....	V

line no. VII to indicate seventh-grade ability in number of questions answered in five minutes; another at the intersection of vertical line no. 3 with grade line no. III to indicate third-grade ability according to index of comprehension; and so on until the pupil's standing in all the subjects had been properly located by dots. The dots were then connected by a heavy line giving the graph as shown. In actual practice the grades marked on the papers were translated directly into properly placed dots on the graph card without constructing tables like Table I. This can be done very rapidly with a little practice. Of course for this purpose the papers should be sorted so as to get all the test papers of one child together. By this means each pupil's graph can be completed before taking up the next.

The order in which the subjects are entered on the graph card is significant. Reading is placed first because all grades are



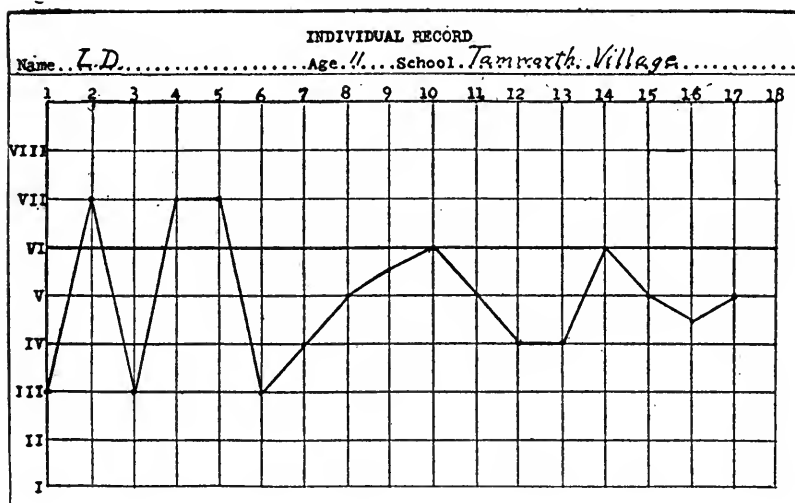


FIGURE 1. SAMPLE OF INDIVIDUAL RECORD. DATA THE SAME AS IN TABLE I

tested for reading ability. Spelling and writing follow since they come early in school life. Then come the four fundamental operations of arithmetic, and so on, those subjects coming last which are taught only in the upper grades. Suppose the subjects were given in the following order: reading, history, spelling, arithmetical reasoning, addition, geography, etc. Then the graph of a third-grade pupil could not be drawn since such a pupil would not be tested for history, geography, or arithmetical reasoning. The dots on the graph card indicating his grade of ability in the subjects which he does take would not be located on consecutive vertical lines. Hence no continuous line connecting the dots could be drawn. With the subjects arranged on the card in the order shown the graph will be complete as far as it goes although it may extend only part way across the card.

Using numbers to represent the subjects on the graph card is not such a disadvantage as it might at first appear to be. One very soon learns to associate the subjects with their respective numbers. The slight disadvantage experienced in the beginning is very much more than offset by the advantage of being able

to use a much smaller card than would be possible if the names of all the subjects were written in.

Next came the problem of deciding upon the grade in which pupils should be placed for the year's work. A glance at the graph for L. D. shows that he had an average of about fifth-grade ability at the beginning of the school year. In fact the average of his grade as shown in Table I is almost exactly five. Clearly then, since the standards are June standards, he belongs in the sixth grade for the current year. Therefore the sixth-grade line on his card was emphasized by overlining to indicate that he is a sixth-grade pupil. Then, with his name, age, and the name of the school entered as shown in Figure 1, the card was ready for filing. In the same manner a graph card was prepared for each child, his grade determined, and the card placed on file.

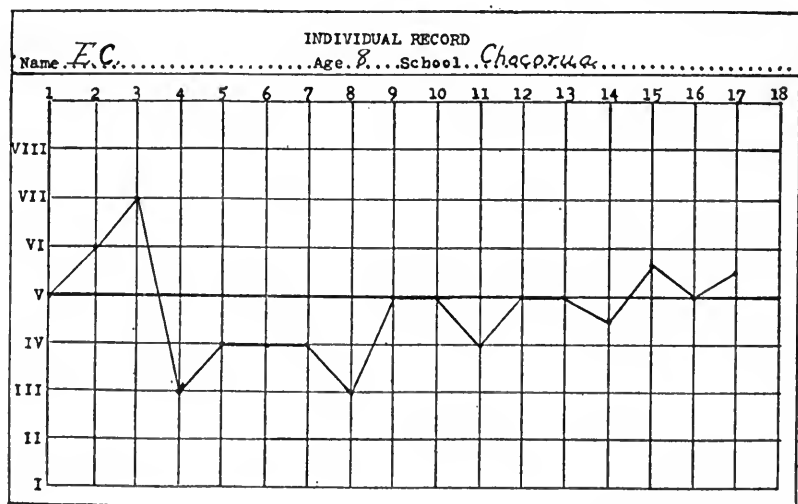


FIGURE 2. SAMPLE OF INDIVIDUAL RECORD OF A BRIGHT CHILD (E. C.)

Within two weeks from the time the first tests were returned a graph card had been filed for every pupil (above the first grade) in the district, and each pupil had been assigned to the grade corresponding to the average ability indicated by his or her graph. A week later each teacher had received copies of

the graphs of her own pupils in order that she might see where their weak points were and govern her work accordingly.

Although in about a score of cases it was later found advisable to place a child a grade above or below that indicated by his graph, on the whole this method of grading has proved surprisingly accurate. Most of the cases referred to were those of very bright children who, on the basis of the test results, would have been advanced to a grade very much above normal for their ages. The graph in Figure 2 illustrates a case in point. This eight-year-old girl shows an average of fifth-grade ability. Her mental age as indicated by the Otis Group Intelligence Scale is twelve years. She is fully capable of doing sixth-grade work this year. However, in spite of the opinions of some eminent educators to the contrary, I cannot convince myself that it is wise to rush such children through school especially in a district like this where the elementary school is pretty sure to see the beginning and end of their school life. Is it not better to keep them in school until they are at least fourteen, giving them a chance to do more and harder work than their classmates of mediocre ability, and supplying them with much carefully selected informational supplementary reading to broaden their minds? There were four other cases of this kind in the same school.

This completes the account of how I used standardized tests and scales to solve my grading problem. I believe that anyone confronted with a similar problem will find the scheme practical. Nor will the labor involved prove either monotonous or uninteresting to him whose heart is in his work.

## THE SPLIT-UNIT PROGRAM IN HIGH SCHOOLS<sup>1</sup>

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The term "split-unit" is used in this paper to designate a subject of study which is pursued for fewer than five class periods a week throughout a school year. One form of the split-unit already is quite familiar and conventional. For example, botany, physiology, trigonometry, solid geometry, and astronomy frequently have been allotted only a half year instead of a year in the program of studies. Courses in these subjects have been known as half-unit courses. The ready acceptance which such courses have received seems to be due to the opinion that certain subjects have a content of information which may be imparted to a student in a half year. When this information is mastered, the subject is said to be finished. Doubtless most of us in the archives of our memory have records of achievement in the domain of finished knowledge. At times we thrill with pride when some chance event unlocks the treasure house and gives us a view of the past. These pleasures of memory seem to be the sole reward and perhaps also the justification of much of our effort. "Forsan et haec olim meminisse juvabit."

The limits set for this paper do not permit a discussion of the value of "finished subjects." Such a discussion would involve consideration of the whole question of functional education. In this respect, then, the split-unit program merely raises a fundamental issue which cannot be settled at this time.

Of more immediate concern is the necessity of reaching an understanding with regard to the time allotment of the various subjects in the high-school program of studies. If pupils had unlimited class periods to dispose of, it might be well to require that they devote to each major subject five periods a week throughout the year. It would then be necessary to decide which subjects are major and which are minor. Is physical education a major subject or a minor subject? Is citizenship a major subject or a minor subject? Shall Latin have as much time in

<sup>1</sup> An address before the High School and College Section of the Southern Wisconsin Teachers' Association at Madison on March 26, 1920.

the program as drawing, or shall it have more? A mere statement of these questions shows the difficulties which the high schools are forced to meet when they attempt to depart from traditional procedure.

And yet they have departed from this procedure in some important particulars. Music, for example, in many high schools is allotted one period a week throughout the four years. Drawing likewise is allotted one or two periods a week for one or more years. Both of these illustrate the use of the split-unit in the program. Music and drawing are supposed to be of sufficient importance to justify a requirement that all pupils shall study them even if the schedule already is crowded.

The situation with respect to music presents very clearly one phase of the split-unit program. In many schools it is customary to devote to choral music one or two periods a week throughout one or more years, frequently through the four years. Why does not some one demand that all instruction in choral music be concentrated in a year or a half-year with five periods a week devoted to it and that the subject be finished and something else "taken up" in its place? The answer to this question is simple. Most teachers think that choral music should occupy the attention of the pupil throughout his entire school career; that it is not a subject which can be "finished"; and that any attempt to concentrate upon it for the purpose of eliminating it sooner would be a serious mistake. Contact with the subject over a long period of time instead of concentration upon it for a short period is the desideratum in the case of music. In the terms of the psychological laboratory, diffusion is deemed preferable to concentration.

On the other hand there are certain forms of motor-learning where concentration appears to be productive of the more valuable results. Laboratory experiments in learning speed in the use of the typewriter, for example, point to the advantage of concentration. Up to this time, however, the experiments to determine the relative values of concentration and of diffusion have not been sufficiently extensive nor have the results been sufficiently clear to warrant any final deductions.

Until scientific experimentation demonstrates beyond a doubt the value of concentration or of diffusion in each of the subjects,

we must be guided in our practice largely by theoretical considerations. Take, for example, such a subject as citizenship, which properly claims now more strongly than ever before an important place in the program of studies. If it were possible at present to teach this new subject five periods a week throughout the four years, we still should not give to it more attention than it deserves. Without extensive modifications of the curriculum, however, such a program is not possible. What shall we do then? To ignore the subject altogether would be acceptable to no one. It remains, then, either to concentrate on one or two short courses in the hope of finishing the subject or to apply the principle of diffusion by devoting a lesser amount of time each week to the class exercises and by continuing the instruction over a longer period. Theoretical considerations weigh heavily in favor of diffusion. Good citizenship, such as we wish to teach in the schools, is not something to be acquired once for all and then packed away among the things to which we need no longer to give our attention. Good citizenship is a growth, an acquisition which becomes ours only by slow degrees at the cost of long-continued effort. Until the teaching of citizenship can have a place in the schedule of every student every day for the four years of his high-school course, let us give it such attention as is possible by using the split-unit program.

Those who are opposed to this type of program-making attempt to support their contentions by referring to the experience of Canada. According to their statements, the split-unit has been tried in Canada, has proved a failure, and is now abandoned. The answer to this contention is that Canada is a large country made up of several large provinces; that the educational practice in the several provinces is not uniform; and that in at least one of the most important of these provinces, Ontario, the split-unit program has not been abandoned and there is no assurance that it will be. Moreover, even if Canada had abandoned this type of program, that fact would prove nothing concerning the statements in this paper, for the Canadian practice had gone far beyond anything that is advocated here.

A unit is a standard which the colleges have set up as an objective for high-school students to attain. It is measured in terms of subject-matter studied by the members of a class for

five periods a week for at least thirty-six weeks. At the time when the definition of a unit was formulated, class periods were quite generally forty-five minutes in length. Increasing numbers of high schools now are lengthening the class period to sixty minutes. Would four sixty-minute periods, in algebra for example, be just as valuable in a student's program as five forty-five minute periods? Would four sixty-minute periods be a split-unit or a full unit? No positive answer can be given to these questions until further experimentation affords the data upon which positive conclusions can be based. Here is a promising field for the scientific investigator.

It is important to note, however, that the definition of the standard-unit stresses the time element rather than the amount of mastery which a student may have over subject-matter. This kind of unit takes but little cognizance of the quality of work which the student performs. It merely sets a minimum standard below which no one who wishes credit for entrance to college may fall. This unit, then, is a mechanical device whereby the colleges assure themselves that their entering students have been in contact with certain subject-matter for a fixed period of time and that those students have fulfilled the minimum requirements of their teachers in that subject-matter. This mechanical device is a great aid to colleges which admit students upon certificate rather than upon examination. Perhaps no more complicated system would be acceptable. We know, however, that some colleges are not altogether satisfied with the unit system. Some of them, for example, require all students to take an entrance examination in English composition. Without regard to the units of credit which a student may submit, he is conditioned in English composition unless he can pass the entrance examination.

If there is any inherent sacredness in the standard-unit, one cannot but ask why the colleges do not organize all of their courses upon the five-hour-a-week basis. It is a matter of common knowledge that large numbers of college courses occupy only three hours a week; that some occupy only two hours; and that a few are only one-hour courses. If the colleges find it convenient and advantageous to exercise discretion in making the time allotments for the various studies, it is not at all unreasonable to suppose that a similar exercise of discretion would be to the advantage of the high schools.

In our American high schools the split-unit program has not been adopted for the purpose of destroying the standard unit. The split-unit has been the only device open to those administrators who wished to give a place to some of the so-called newer subjects. For these subjects it usually has been the split-unit plan or nothing. However, if objections raised by the colleges to a split-unit program should lead to a re-examination of the significance and of the value of the standard unit for the purpose of bringing it into harmony with the progress which the high schools are making, the result would be clear gain and would justify the courage which some high-school administrators have shown. In the meantime it is not too much to hope that our experimental psychologists will give us further help in the problem of program-making.



# COMMON SCHOOL FINANCE IN COLORADO AND CERTAIN INFERENCES OF NATIONAL IMPORT (*Concluded*)

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*University of Minnesota*

## DISBURSEMENT OF REVENUES

The income of the public school fund, technically known as "the public school income fund," is apportioned semi-annually (in July and January) by the superintendent of public instruction among the counties in proportion to the school population as reported for the next preceding year.<sup>63</sup>

The general county school fund, as explained above (page 659) includes all moneys paid into the county treasury derived from: (1) the national forest reserve fund; (2) public school income fund; (3) general and special county school taxes; (4) sales of lost goods and estrays; (5) fines. This general fund is apportioned quarterly in January, April, July, and October by the county superintendent. "He may apportion the same at other times if there be sufficient money in the treasury to require it."<sup>64</sup> This general county school fund is apportioned among the districts upon the same basis (school census, 6 to 21 years<sup>65</sup>) as that upon which the income of the public school fund is apportioned among the counties.<sup>64</sup> The general fund by apportionment disbursed to the counties in the year 1914-1915 totaled \$386,293.87 and in the year 1915-1916, \$475,482.19.<sup>66</sup>

## LAWFUL AND FORBIDDEN USES

*Public school fund.*—Subject to the provision in the Constitution (articles v and ix) which forbids using public moneys for private or sectarian institutions, the major portion of the public school income fund is distributed without assigning any definite objects upon which it must be expended. The expenditure of

<sup>63</sup> *Colorado school laws, annotated*, 1917, p. 155, sec. 312.

<sup>64</sup> *Ibid.*, p. 54, sec. 105.

<sup>65</sup> *Ibid.*, p. 144, sec. 285.

<sup>66</sup> Computed from data in *Colorado state auditor's report*, 1915-1916, p. 43, by subtracting from the sum total of the annual apportionment the apportionment to the secretary of the State Teachers College and the Gunnison Normal School.

certain quotas of it, however, are defined by law. These include: (1) money to provide for the cost of furnishing school officials and teachers with blanks and report books;<sup>67</sup> (2) a sum not to exceed \$150,000 (1919) to be set aside out of the income of the public school fund as a minimum wage for teachers fund to aid districts unable to pay the minimum legal wage.<sup>68</sup>

The state board of land commissioners is authorized to deduct not more than 10 percent from the receipts of mineral rents and royalties to pay the expenses of administering school lands.<sup>69</sup> These rentals would otherwise be added to the invested principal of the fund. Hence they are excluded from our discussion of the uses of the public school fund income.

*General fund by apportionment.*—The public school income fund, together with the other funds which go to make up the general fund by apportionment, may be used by districts for any objects whatsoever except:

For building, furnishing or erecting additions to any school house, or for the purchase or improvement of any school house, site or lot; Provided, That if any portion of the aforesaid school fund remains to the credit of any district after the payment of all expenses necessary to the support of a public school for a period of ten months in any one year, in said district, it shall be lawful for the district board to use such balance for any of the purposes, provided for in section 51 of this chapter.<sup>70</sup>

*County funds.*—The moneys derived from the county general school tax can be used for teachers' wages only.<sup>71</sup> The law forbids that moneys received from the general fund by apportionment shall be used for building purposes.<sup>72</sup> The legislature of 1919 enacted a law establishing an annual salary scale for county superintendents and providing that they be paid from the general fund.<sup>73</sup>

*District revenues.*—The question, to what uses may money derived from district sources be lawfully put, has been largely answered by the paragraphs setting forth the objects for which

<sup>67</sup> *Colorado school laws, annotated*, 1917, p. 153, sec. 310; p. 154, sec. 312.

<sup>68</sup> *Colorado educational laws*, 1919, pp. 35-36, secs. 1-3; for further discussion see below, pp. 751-52.

<sup>69</sup> *Colorado school laws, annotated*, 1917, p. 106, sec. 187.

<sup>70</sup> *Ibid.*, pp. 106-7, sec. 188.

<sup>71</sup> *Ibid.*, p. 162, sec. 331.

<sup>72</sup> *Colorado educational laws*, 1919, p. 20, sec. 13. The scale for superintendent's annual salary is as follows: two counties of Class I (Division A), \$3,000; 4 counties of Class I (Division B), \$2,800; 6 counties of Class II, \$2,000; 20 counties of Class III, \$1,500; 19 counties of Class IV, \$1,100; 8 counties of Class V, \$900; 2 counties of Class VI, \$500; 2 counties of Class VII, \$100.

districts may tax themselves. The largest single item of expense in every school system is teachers' salaries. We have seen how the county restricts the use of the proceeds of the county general school tax to this single object. This policy is continued by the districts with certain limitations. The law seeks to provide as completely and effectively as possible for the legal minimum teacher's wage. In advance of the day designated for levying the special school tax it requires the school board of each district to certify to the county commissioners that part of the special tax (not exceeding ten mills) which, with all other apportionments from the county and state, shall be sufficient to pay the legal minimum wage to each teacher in the district for not less than six months. " . . . Such part of the special tax levy shall be made by the county commissioners and used for the purpose of paying teachers' salaries only."<sup>72</sup>

*Kindergartens.*—As long ago as 1893 Colorado empowered district boards to establish and maintain free kindergartens as a part of the public school system and provided that such kindergartens should be supported by the district special school fund.<sup>73</sup>

#### REQUIREMENTS FOR PARTICIPATION

When grants from the state are made to depend upon the fulfillment of certain requirements, it is possible to use such state funds to insure the lawful use of school moneys, the securing of school reports, the enforcement of certain provisions, and the maintaining of definite standards. Policy varies in the United States all the way from "no requirements for participation" in such states as Alabama, Georgia, Iowa, and Tennessee, to a long list of requirements in such states as Massachusetts, Michigan, and Minnesota.

Colorado has thus far made little attempt to use the income of her permanent public school fund, the general fund by apportionment, or any other income fund as a leverage for enforcing school laws or elevating school standards. Instead of imposing upon school districts penalties in the form of forfeitures of quotas of state aid as Massachusetts does with her towns, Colorado places the responsibility and penalty upon the officer to whom the law has delegated the execution of the act or rule. The officer who

<sup>72</sup> *Colorado session laws*, 1893, p. 436, sec. 1; *Colorado revised statutes*, 1908, pp. 1396-97, sec. 5927; *Colorado school laws, annotated*, 1917, p. 132, sec. 257.

fails in his duty to see that the provisions of the laws are complied with "shall be removed from office and the vacancy filled as in other cases."<sup>74</sup> If the district census is not furnished to the county superintendent, the secretary of the district board forfeits \$100 and must make good any loss suffered by the district. Again, "the person or persons through whose neglect or refusal the failure so to levy (the county school tax) shall occur, shall forfeit the sum of one hundred (\$100) dollars each and be liable for all damages resulting from such failure."<sup>75</sup>

Only one condition is definitely provided in the laws, which must be met by a district in order to receive its share of the school fund, namely, the maintenance of "a public school at least three months of the school year."<sup>76</sup> This minimum term of three months is practically of little importance at the present time. The law providing a minimum wage for teachers provides special aid for all school districts unable to support a school at least six months.<sup>77</sup> For this and other reasons the number of districts maintaining a school less than six months (120 days) constitutes an almost negligible minority.<sup>78</sup> A study of the 52 county superintendents' reports for the year 1915 received by the superintendent of public instruction showed only 62 districts maintaining school less than 120 days.<sup>79</sup>

Not as a result of legal provisions, but from the very nature of the case, any district wishing to participate in the general fund by apportionment must furnish the county superintendent with a statement of the school census. The furnishing of this school census thus becomes a condition of participation in the fund although as already pointed out it is the secretary of the board who is penalized for such a failure.

### INEQUALITIES OF SCHOOL BURDENS AND PUBLIC AID

*Purposes of public school aid.*—There are two fundamental reasons why the state should possess general school revenues with which to aid the individual constituent school communities: (1) in order to insure to every child in the state the opportunity

<sup>74</sup> *Colorado revised statutes*, 1908, p. 1416, sec. 6012.

<sup>75</sup> *Ibid.*, p. 1399, sec. 5936; p. 1386, sec. 5894.

<sup>76</sup> *Ibid.*, p. 1385, sec. 5891.

<sup>77</sup> *Colorado school laws, annotated*, 1917, p. 168, sec. 340.

<sup>78</sup> "A school month shall be 4 weeks, a school week 5 days." *Colorado revised statutes*, 1908, p. 1416, sec. 6013.

<sup>79</sup> *Report of the Colorado school system*, p. 57.

of going to school; (2) to make such opportunities as far as possible equal. Equality of educational opportunity for all the children of the entire state is a brief but correct statement of the aim underlying general, that is, state and county aid. Equality implies much more than universal education and state-wide equality in the length of the school year. It means equality of conditions under which children study and play. It means trained teachers, and healthful, well-equipped, inviting school houses and yards, equality in the scope, vitality, and richness of studies. The only possibility of approaching equality in this broad sense lies partly in proper organization and administration of school units and partly in equality of school support. Equality in school support means equal distribution of economic responsibility and economic power. Such economic equality can come only if the amount of aid granted to the school unit (in Colorado, the district) is determined on the basis of the ability (i.e., the financial resources) and the effort of this unit. Data concerning enrollment and school attendance given in an opening paragraph reveal strikingly the inequality of educational opportunity. How far Colorado is from succeeding in her efforts in this direction is shown by the Table VIII.

In order to show the inequality of conditions between counties, the counties ranking lowest and highest have been chosen in each case with intervening counties representing as nearly as possible equal gradations of variation. In two cases, only 60 of the 63 counties furnished data, in a third case only 61 and in a fourth case only 62. On this account it was impossible to select the same numerical ranks for each group of data.

From Table VIII it is seen that the proportion of children not enrolled in school during eight years from 1906 to 1913 varied all the way from 7 to 59 percent; the school year from 98 to 167 days; teachers' average monthly salary from \$39 to \$81; and expenditure per child from \$21 to \$77. The fact that Items I, II, and III represent an eight-year average greatly increases their significance. In connection with Item IV it may be noted that whereas for the entire state the *average* expenditure per child in attendance in 1914-1915 was \$60.43, the *median* expenditure per child in attendance in the same year—represented by Moffat County—was only \$40.42. On the basis of the average for the entire state

TABLE VIII. INEQUALITIES OF EDUCATIONAL OPPORTUNITY AMONG COUNTIES

ITEM I. ENROLLMENT				ITEM II. SCHOOL YEAR		
COUNTY		CHILDREN NOT ENROLLED(b)		COUNTY		LENGTH OF YEAR IN DAYS(d)
Rank(a)	Name	Per-cent	No.	Rank <sup>c</sup>	Name	
1	Sedgwick	7	46	1	Crowley	167
12	Kiowa	16	117	15	Cheyenne	151
34	El Paso	22	483	31.5(e)	{ Douglas	141
48	Elbert	27	455		{ Jackson	141
60	Baca	41	278		{ Las Animas	141
					{ Pueblo	141
				45	Montezuma	133
				61	Baca	98
ITEM III. TEACHERS' SALARIES				ITEM IV. EXPENDITURE PER CHILD		
COUNTY		TEACHERS' AVERAGE MONTHLY SALARY(f)		COUNTY		ANNUAL EXPENDITURE PER CHILD ENROLLED(h)
Rank(a)	Name			Rank(g)	Name	
1	Gilpin	\$81.00		1	San Juan	\$77.31
15	Otero	64.50		16	San Miguel	50.45
28	Bent	59.00		31	Moffat	40.42
45	Kiowa	53.50		46	Routt	33.65
60	Washington	39.00		62	Costilla	21.39

a Based on reports of 60 counties. Ranks computed. An eight-year average 1906-1913.

b SARGENT, C. G. *Rural and village schools of Colorado*, p. 14, table 2. Percents computed.

c Based on reports of 61 counties. Ranks computed. An eight-year average 1906-1913.

d *Ibid.*, p. 44, table 9.

e *Ibid.*, p. 56, table 13.

f Based on reports of 62 counties. Ranks computed. Figures for 1914-1915.

h *Report of the Colorado school system*, p. 60, table 31.

Colorado ranked ninth in the Union. On the basis of the median county her expenditure corresponded approximately to that of Illinois—a state which with an average expenditure in 1914-1915 of \$40.53 per capita of attendance ranked twenty-eighth in the Union.<sup>80</sup>

It would be illuminating to compare the counties in Colorado, as to each of the items included in Table VIII, with states which most closely approximate the conditions existing within the county. As space will not permit such a comparison, it has

<sup>80</sup> *United States commissioner of education report*, 1917, 2:55, table 16.

seemed best to select the average expenditure per child in attendance. Table IX presents the annual average expenditure for certain selected counties and the annual average expenditure in the state most closely approximating that of the county. By noting the rank of the state, we may discover how many states in the Union spend more and how many less than the county in question. We also discover that there are counties in Colorado (than which state there are only nineteen richer in the Union) which from the standpoint of annual expenditure per child must be ranked with such states as Missouri.

TABLE IX. COUNTIES IN COLORADO COMPARED WITH CERTAIN STATES AS TO AVERAGE ANNUAL EXPENDITURE PER CHILD IN ATTENDANCE, 1914-1915

COUNTY <sup>a</sup>			STATE <sup>b</sup>		
Name	Rank in State <sup>(c)</sup>	Amount	Name	Rank in United States <sup>(d)</sup>	Amount
San Juan.....	2	\$101.06	Montana.....	1	\$81.68
Crowley.....	16	68.96	North Dakota..	6	69.62
Ouray.....	31	56.27	Wyoming.....	12	56.45
Otero.....	46	49.76	Pennsylvania..	17	49.82
Costilla.....	61	35.36	Missouri.....	31	37.30

<sup>a</sup> Report of the Colorado school system, p. 60, table 34.

<sup>b</sup> United States commissioner of education report, 1917, 2:55, table 16.

<sup>c</sup> Reports for 61 counties—seven of which are given with the following footnotes: "Data on this item (average cost per pupil, 1914-1915; cost based on average daily attendance) given in reports from these counties are so incomplete that absolute accuracy is not possible." Baca County with an amount of \$118.06 ranks first and is omitted here as it is doubtless erroneous. Ranks computed.

<sup>d</sup> Ranks computed.

Such conditions as those revealed by the above table, which were brought to light by the surveys of Sargent and Monahan and Cook, and which still continue, leave no doubt of the need for radical reform. Sargent wrote several years ago: "The more carefully the subject is studied and the more thorough the investigation, the worse conditions are found to be." These surveys and more recent data show beyond dispute that thousands of children of school age in the state are out of school every day, and that thousands of those who attend are housed in miserable buildings, and are taught by teachers who are under-paid, ignorant, and either untrained or ill-trained for their work.<sup>81</sup>

<sup>81</sup> SARGENT, C. G. *Rural and village schools of Colorado*, pp. 5, 14-15, 22, 65-81.

*Primary need not more school money.*—The cause of these conditions is not to be found primarily in the lack of adequate school moneys. Colorado undoubtedly needs more money for her schools, as does every state in the Union. But more necessary than increased revenues is a complete reform in the organization of her school system, particularly the abolishment of the present district system, and a complete reform in the methods of school support. Before undertaking to suggest financial reforms needed, let us consider somewhat further than has been done the inequalities among counties and among districts resulting from present methods.

*Inequalities of county school burdens.*—Monahan writes: "State funds are supposed to equalize the burden of education among the various counties, some of which have low valuation and a large school population, and even with high taxes have difficulty in raising enough money to support good schools."<sup>82</sup> The amount of state aid granted to a county or to a district should depend, therefore, upon two things: (1) the unit's potential ability to aid itself as expressed in its assessed valuation per school child; (2) the degree of effort made by the unit (county or district) to aid itself as measured by the ratio between its local tax and its valuation.

TABLE X. INEQUALITIES OF COUNTY SCHOOL FINANCE IN  
COLORADO AS SHOWN BY VARIATION AMONG SIXTY-  
THREE COUNTIES, 1914-1915

	Lowest	Median	Highest
Valuation of county per school child( <i>a</i> ) . . . . .	\$1,822 (Baca)	\$5,615 (Pitkin)	\$22,674 (Park)
County school tax in mills( <i>b</i> ) . . . . .	0.40 (Delta)	1.00 (Alamosa)	3.75 (Mineral)
Received from state fund			
Per child in average daily attendance( <i>c</i> ) . . . . .	\$2.76 (Las Animas)	\$3.67 (Gilpin)	\$6.46 (Washington)
Per teacher employed( <i>c</i> ) . . . . .	\$27.00 (Park)	\$65.00 (Alamosa)	\$121.00 (Conejos)
Proportion total school support received from:			
State( <i>d</i> ) . . . . .	3% (Park)	.....	16% (Conejos)
County( <i>d</i> ) . . . . .	5% (Delta)	.....	49% (Denver)
District( <i>d</i> ) . . . . .	45% (Denver)	.....	87% (Delta)

*a* Report of the Colorado school system, p. 37.

*b* Ibid., p. 43.

*c* Ibid., p. 38.

*d* Ibid., pp. 35-36.

<sup>82</sup> Report of the Colorado school system, p. 36.



The unfairness of the school situation and the injustice attending the present division between the various counties of the burdens of school support become evident when we consider inequalities in valuation, in school tax levied, and in amount of state aid received. Table X presents these inequalities by indicating the lowest, median, and highest datum in each case.

The chief purpose of Table X is to show how widely counties vary in their potential ability to finance their schools, in their educational efforts and zeal, and in the amount of aid they receive from the state. Table XI aims to show to what extent Colorado's present methods of school finance establish a balance between these three factors—valuation, county tax, and state aid.

TABLE XI. A COMPARISON OF THE FINANCIAL ABILITY AND SCHOOL BURDENS OF CERTAIN SELECTED COUNTIES IN COLORADO, 1914-1915

COUNTY	VALUATION OF COUNTY PER SCHOOL CHILD (6-21)(a)		GENERAL COUNTY SCHOOL TAX IN MILLS (COUNTY HIGH-SCHOOL TAX INCLUDED)(b)	RECEIVED FROM STATE FUND		PERCENT OF TOTAL SCHOOL SUPPORT RECEIVED FROM:(c)		
	Amount	Rank		Per Child in Average Daily Attendance(a)	Per Teacher Employed(a)	State	County	District
Baca.....	\$ 1,822	1	2.00	.....(d)	\$49	12	27	61
Washington....	3,516	8	1.25	\$6.46	40	14	9	87
Larimer.....	4,450	16	1.10	3.51	81	8	19	73
Alamosa.....	5,057	24	1.00	3.66	65	6	15	79
<i>Hypothetical median</i> .....			1.00(e)	3.67(e)	65(e)	7.3(e)	17(e)	76.2(e)
Pitkin.....	5,615	32(f)	1.50	3.38	72	5	19	76
El Paso.....	6,003	40	1.74	3.65	78	5	27	68
Eagle.....	7,291	49	0.60	3.80	43	6	12	82
Cheyenne.....	9,542	56	1.66	3.07	30	4	17	79
Park.....	22,674	63	0.80	3.61	27	3	31	66

a Report of the Colorado school system, p. 37, table 15.

b Ibid., p. 43, table 23.

c Ibid., pp. 35-36, table 14.

d Data omitted as unavailable. See p. 38 of *ibid.*

e Computed.

Median in valuation as will be evident from rank.

From Table XI we see that Park County, whose valuation per school child is over \$22,000, receives more state aid per child in average attendance than Cheyenne, Pitkin, or Larimer counties, each of which has a far lower valuation and whose local tax is higher. Again, Park County which is approximately four times as rich as Pitkin County levies a county tax only eight-fifteenths as great and whereas Park County received from the state \$3.61 per child, Pitkin receives only \$3.38. It is unnecessary to point out further the inequality in school financial burdens, aid, and effort

revealed by Table XI. Attention should be called, however, to the fact that the poorest of all, Baca County, levies the highest county tax, and that of the counties selected, four (Alamosa, Pitkin, El Paso, and Larimer) received much larger quotas from the state per teacher employed.

*Inequalities in district support.*—The inequalities resulting from Colorado's present system of school support are even more evident when we compare district with district than when we compare county with county as will be seen from Table XII.

TABLE XII. A COMPARISON OF FINANCIAL ABILITY AND DISTRIBUTION OF SCHOOL BURDENS IN TWO COUNTIES (CONEJOS AND OTERO) OF COLORADO, 1914-1915

COUNTY AND DISTRICT	RANK IN VALUATION	VALUATION OF DISTRICT PER CENSUS CHILD (a)	RECEIVED FROM STATE FUNDS		District Tax in Mills (c)	PERCENT OF TOTAL SCHOOL SUPPORT RECEIVED FROM: (d)		
			Per Child in Average Daily Attendance (b)	Per Teacher Employed (b)		State	County	District
CONEJOS COUNTY (27 districts) (e)								
29	1	\$ 617	\$9.24	\$171	7.00	21	35	44
26	7	1,234	5.65	181	1.06	26	47	27
Median (h)	.....	2,072	3.49	93	3.20	15	24.3	61.5
14 (f)	14	2,072	4.38	98	3.07	14	24	62
16	21	6,117	2.93	32	2.02	9	16	75
15	27	26,545	3.69	59	0.68	7	12	81
OTERO COUNTY (22 districts) (e)								
11	1	3,374	3.08	68	6.5	5	10	85
29	6	5,752	2.42	81	2.1	2	4	94
23 (i)	11 (i)	7,475	5.32	60	2.7	6	11	83
Median (i)	.....	7,792 (g)	2.95	65.50	2.55	7.1	12.5	81.6
9 (i)	12	8,109	2.91	77	2.7	7	14	79
20	17	10,227	2.98	67	2.6	7	13	80
13	22	21,544	3.08	64	2.0	5	9	86

a Report of the Colorado school system, p. 39, table 18.

b Ibid., p. 40, table 20.

c Ibid., p. 42, table 22.

d Ibid., p. 41, table 21.

e The numbers by which the districts are named exceed the number of districts reported, e.g. in Otero County where 22 districts are reported, the sixth in rank in District 29.

f Median in valuation as will be evident from rank.

g A hypothetical district included to indicate median valuation.

h Computed. i The median lies between these two districts, 22 and 9.

From Table XII it is evident that Conejos County, District No. 12, whose valuation per census child is just half that of District No. 26, taxes itself nearly seven times as much, yet receives 5 percent less aid from the state, 12 percent less from the county, and 17 percent more from the district. District No. 15, whose valuation per census child is more than four times that of District No. 16, receives from the state \$0.76 more per child in attendance

and \$27 more per teacher employed. District 16 levies a tax of 2.02 mills, whereas District 15 levies a tax of only 0.68 mill, yet so much greater is the latter's valuation that she derives 6 percent more of her total school moneys from her district fund than does District No. 16. Similar conditions are revealed when we consider Otero County, as will be seen readily by comparing District No. 29 with 23, or 23 with 9, or 20 with 13. Tables XI and XII reveal in a striking manner not only the wide variation between counties and between districts within the same county with respect to valuation per census child but also how defective is the present system of school support. From this brief description of the inequalities of educational opportunity, school burdens, and school aid, we may now turn to consider the efforts Colorado has made to reduce these inequalities.

#### EFFORTS TO REDUCE FINANCIAL INEQUALITIES

*Permanent school emergency fund and minimum wage for teachers fund.*—Educational leaders in Colorado long ago realized the inequalities in school conditions and maintenance. The public school emergency fund and later the minimum wage for teachers fund were created in an attempt to overcome these inequalities. Neither fund provided any additional source of aid. Both were provided by setting aside out of the public school income fund a certain sum of money to aid especially needy districts.

The permanent school emergency or call fund was created in 1911.<sup>83</sup> From the income of the public school fund \$20,000 were set aside to aid any district which, through unavoidable misfortune or casualty, might be unable to provide from the combined proceeds of the special tax and its quota of the general fund by apportionment proper and necessary school facilities. I find no record of any transfer to this fund since the biennium 1912-1914.

The minimum wage for teachers fund, created in 1913,<sup>84</sup> provided for setting aside out of the income from the public school fund a sum not to exceed \$60,000 to be paid to districts unable to derive from all other state, county, and district school revenue a sum sufficient to pay each teacher employed in the district at least \$50 per month for six months.<sup>85</sup> This act was important

<sup>83</sup> *Colorado session laws*, 1911, p. 143.

<sup>84</sup> *Ibid.*, 1913, chap. 156; *Colorado state treasurer's report*, 1915-16, p. 49.

<sup>85</sup> *Colorado school laws, annotated*, 1917, pp. 168-70, sec. 340.

not only in providing this fund but in several other respects as well; it recognized a new basis of apportionment, namely, the number of teachers employed; it provided a new method of apportioning the general county tax proceeds; it created a leverage for encouraging both districts and counties to tax themselves to the maximum. In this law we discover an effort to stimulate local taxation in the provision that no aid shall be received from the minimum wage for teachers fund by any county whose commissioners fail to make the maximum levy.<sup>86</sup>

The legislation of 1919 continues the minimum wage for teachers fund with few but important modifications. The sum to be drawn for this purpose, from the income of the public school fund, is raised to \$150,000.00; and the minimum salary of teachers in third-class districts is put at \$60 per month and at \$75 for first- and second-class districts.<sup>87</sup>

Table XIII shows the condition of the fund for 1914 to 1920.

TABLE XIII. MINIMUM WAGE FOR TEACHERS FUND.  
RECEIPTS AND DISBURSEMENTS, 1914-1920

	1914-16(a)	1916-18(b)	1918-20(c)
Balance from previous biennium	\$7,404.35	(d)	.....
By receipts fund. ....	48.00	(d)	.....
Transferred from income of public school fund. ....	40,000.00	(d)	\$150,000.00
Total. ....	\$47,452.35	\$6,218.64	\$150,000.00
Paid to county for districts. ....	41,233.71	6,218.64(d)	.....
Balance, Nov. 30. ....	\$6,218.64		

a *Colorado state treasurer's report*, 1915-16, p. 49.

b *Ibid.*, 1917-18, p. 9.

c *Colorado educational laws*, 1919, pp. 35-36, sec. 3.

d None reported except balance for biennium 1914-1916.

*Suspension of tax limit.*—In 1917 it was enacted that except as otherwise expressly provided, the exercise of taxing power of every taxing body in the state, including the general assembly, shall be limited so as to prohibit the levying of a greater amount of revenue for any year hereafter than was levied the preceding year plus 5 percent. However, districts desiring to increase their tax rate beyond 5 percent may appeal to the state tax commission.

<sup>86</sup> *Ibid.*, p. 169, sec. 340.

<sup>87</sup> *Colorado educational laws*, 1919, pp. 35-36, secs. 1-3.

If the commission refuses or fails to recommend such an increased levy, or if the excess levy, not exceeding five mills, is not sufficient to meet the needs, the question may be submitted to the voters of the taxing district and if three-fourths of the voters cast their votes in favor of an increased levy, the tax officers may make such an increased levy for the year voted upon.<sup>88</sup>

### NEEDS AND RECOMMENDATIONS

The school emergency fund, the teachers' minimum wage fund, and the law providing for excess tax rate no doubt have provided possible relief for a limited number of districts. Nevertheless what is needed in Colorado is not a fund which will enable a limited number of her poorest districts to attain a level far below that of the state average, but rather a system of school finance which will provide for the following:

1. A current state school fund which, together with the income from other assured state sources, will be sufficient to enable the state educational authorities:
  - (a) To supply quotas which, together with local school revenues, will make it possible for the state authorities to see that every community maintains a satisfactory school for a period of not less than nine months;
  - (b) To protect the "infant industries," that is, to foster new studies, new types of schools, and in general, new educational projects;
  - (c) To furnish incentives in the form of state aid whereby indifferent but capable units will be stimulated to greater and greater effort;
2. A scientific method and basis of apportioning school moneys;
3. Definite requirements to be fulfilled as conditions for receiving quotas from the general state apportionment.

In addition to modifications based on general principles, various other changes of more local nature should be made. Most important of these are: (1) A modification of the present method of the management of school lands and the investment of school moneys belonging to the permanent public school fund; (2) Increase of the county tax levy; (3) The provision of means whereby

<sup>88</sup> *Colorado school laws, annotated*, 1917, p. 10, sec. 15; pp. 163-64, sec. 333.

the levy and assessment of at least the required minimum rate can be assured.

*Management and investment of public school funds.*—It has been stated in a preceding paragraph that the year 1918 marked a radical improvement in Colorado's manner of investing the principal of her public school fund. Whereas in 1916 nearly one-fourth of the moneys belonging to this principal were uninvested and lying on deposit in banks throughout the state, in 1918 no moneys are reported as deposited in banks. Again, in the former year state warrants and bonds constituted the chief securities, whereas in 1918 we find the fund invested in United States bonds, county, municipal, and district bonds and farm loans.

*Care and sale of school lands.*—There has been no lack of dissatisfaction in the past with Colorado's policy respecting her school lands. Register Hoggat was undoubtedly expressing the judgment of many when he wrote in 1914:

The state of Colorado should as quickly as possible get out of the land business. All our state lands should be sold to actual settlers or to those who will improve them as the state deems for its best interests and the promotion of their settlement, as our laws plainly direct. The state is a poor landlord and the leasing of state lands should be minimized.<sup>89</sup>

The chief reason given by Register Hoggat for urging the sale of Colorado's 3,293,997 acres of unsold school lands is that the proceeds of the sale of this land, properly invested, would supply the schools with a revenue nearly three times as great as that derived from renting them.

Certainly no effort should be made to hasten unduly the sale of large school land areas until a thoroughly satisfactory system of investing the proceeds of these sales has been worked out. The need is not to get rid of these lands as rapidly as possible, because "the state is a poor landlord" but to insist that the state become a good landlord. The individual citizens of the state should be made to realize the vast prospective value of these lands, the complete impossibility of caring for them with the present meager staff and the meager expenditure allowed to the board of land commissioners.

*A state school tax.*—The objects for which a sufficient state school revenue should be provided have been pointed out in

<sup>89</sup> *Colorado state land commissioners' report*, 1913-14, pp. 4-5.

an earlier paragraph. In the year 1914-1915 Colorado's total expenditure for public schools was \$6,778,503, of which only 8.8 percent (\$598,607) was from state revenue.<sup>90</sup> Such a sum is entirely too small to accomplish the purposes which should be realized through state aid. The experience of a number of our states has shown that a permanent common school fund should not be relied upon as the chief source of state school revenue. The only method of providing a state fund sufficient to keep pace with the increase of the school needs and sufficient to enable the state, first, to make up for the inequalities existing between individual communities and, second, to exert the influence which should be exerted, is the levying of a state school tax. Neither special appropriations which depend upon the judgment and attitude of the legislature from year to year nor the income of a permanent fund can in any sense take the place of a state tax.

A question of supreme importance is what proportion of the total revenue for common schools should be furnished by the state. Monahan and Cook are of the opinion that the state should furnish approximately one-third.<sup>91</sup> The same ratio has been suggested by various other writers. It would be just as sound *a priori* to suggest one-half or one-tenth. It is unnecessary, however, to be satisfied with any such *a priori* or arbitrary answer to our question. A scientific answer can be arrived at by determining (1) what items of school expenditure are most important in determining educational equality or inequality; (2) by assigning all such items of expenditure and support to the care of the state; (3) by ascertaining what percent the total cost of the sum of such items will constitute of the total expenditure for common schools. Elsewhere I have given this topic a somewhat full treatment.<sup>92</sup> It will, therefore, be sufficient to present at this point merely a summary of conclusions.

The factors which to the largest degree determine the equality of educational opportunity offered by the various communities of a state are (a) the number and quality of teachers employed; (b) general control and supervision; (c) apparatus directly related to instruction, including such materials as library books, labora-

<sup>90</sup> *United States commissioner of education report*, 1917, 2:51, 53.

<sup>91</sup> *Report of the Colorado school system*, p. 45.

<sup>92</sup> See SWIFT, F. H. "Existing educational inequalities," *American School Board Journal*, 60:29-30, May 1920.

tory apparatus, and textbooks. Until the state provides, directs, and distributes these factors, the present chaos of educational inequality will continue.

Upon the basis of present conditions it seems safe to say that the proportion of the total expenditure to be borne by the state would range far beyond the suggested one-third, perhaps leaving little more than one-third to be borne by the local unit. It is doubtful whether at the present time it would be practicable, even if possible, for any state to assume at once the full measure of responsibility we have suggested. Of one thing we may be sure, namely, that it would be unwise to establish for the United States as a whole or even for one state any inflexible percentage division between state and local units. Both the rate of the school tax, state and local, and the percent of costs to be provided from state and from local sources respectively should be left to some supreme state board or agency so constituted as to be entirely free from political influence. Such a board or agency should have the power not only to determine these matters but to modify the percentage division and the tax rate from time to time as conditions demand.

*Reforms in county finance.*—The present law requires every county to levy annually a general county school tax of not less than two mills. Yet a survey of 1914–1915 showed that out of the 63 counties in the state, 50 levied a tax less than two mills, and only 3, Mineral, Gilpin, and Logan, a tax exceeding two and a half mills.<sup>93</sup> It is evident that the first reform needed with respect to the county school taxation is the creating of some agency whereby counties shall be compelled to levy, assess, and collect the minimum school tax. In the case of districts which fail to levy the required district school tax, the county commissioners are empowered to levy it. A similar policy should be established whereby state officials should be empowered to levy and collect a minimum county school tax in all counties which fail to do so of their own accord.

The inequalities in valuation and in tax rate between school districts and the inadequacy of school facilities show conclusively that the rate of the county minimum school tax (the chief source

<sup>93</sup> *Report of the Colorado school system*, p. 43; *Colorado school laws, annotated*, 1917, pp. 161–62, sec. 331.



of county school fund) should be increased sufficiently to insure, together with the quotas received from the state and district, funds necessary for providing a satisfactory school in every community. From this consideration of the reforms needed in the provision and care of the sources of school revenue, we shall now turn to the modifications needed with respect to the disbursement of school funds.

*A reformed method of apportionment.*—It is undoubtedly true that at the present moment even more important to Colorado than larger revenues is the adoption of a scientific method of disbursing school moneys. If the present funds were apportioned according to a sound method and conditioned upon the local community's fulfilling the proper requirements, the inequalities and defects would be greatly reduced. This leads naturally to a consideration of the changes needed: (1) in the conditions of participation in the state school revenues; (2) in the method and basis of apportioning school moneys.

*Conditions of participation.*—By making maintenance of a school for the minimum legal term the sole condition which the district must fulfill in order to receive its quota of state aid, Colorado has failed to employ one of the most effective of all means by which established standards can be enforced and new ones introduced. The following list compiled from requirements imposed by other states suggests something of what Colorado might do: (1) raising of a local tax; (2) lawful expenditure of school moneys; (3) employment of teachers of specified qualifications; (4) maintaining a school for a fixed number of months; (5) providing equipment satisfying state standards; (6) providing instruction in the subjects required by law; (7) submitting the reports required by the state or other educational authorities; (8) provision of free textbooks; (9) enforcement of compulsory education and truancy laws; (10) fulfilling all state school laws and regulations.

*Reform in the method and basis of apportionment.*—Earlier paragraphs have shown: (1) that in comparison with other commonwealths in the Union, Colorado is well supplied with school moneys; and (2) that the portion of state and county aid given a district bears little or no relation to its valuation or to its local school tax. State moneys are apportioned among the various

counties, and county moneys among the various districts on the same basis, namely, the school census (persons six to twenty-one years). School census is the most ineffective, unfair, and disastrous basis employed in distributing school moneys to be found in the United States today. Moreover, Colorado's school census age is fictitious. A considerable portion of the population in any county or district falling within its limits do not attend school at all. Furthermore, the compulsory school age is from eight to sixteen years. Thus, whereas the compulsory school age covers only nine years, the age upon which the school moneys are apportioned covers sixteen years. Apportioning school moneys upon the basis of the school census results in giving individual communities aid for hundreds or thousands of children between fourteen and twenty-one who are not even enrolled in school. The result is that more populous districts receive an undue amount of aid.

Furthermore, the school census basis ignores entirely two of the most important factors involved: (1) the financial resources of the unit aided; (2) the degree of effort it makes to maintain its schools. Monahan writes:

The distribution of the State funds on the census basis does not equalize the burden between the counties due to the unequal valuation per school child, nor does it contribute to the counties in proportion to what they are doing for the education of the children of the State. The cost of maintaining schools does not depend upon the number of children living in the county, or district, but upon the number who attend school, the number of days school is maintained, and the number of teachers employed. A distribution on the census basis takes none of these essentials into consideration. This is particularly true where the (school) census includes all persons from 6 to 21 years of age, or 5 years beyond the compulsory age limit and 2 years beyond the normal age of graduation from the high school.<sup>94</sup>

Elsewhere the same writer continues:

The county (school) tax, distributed as at present, works to the advantage of the first and second class districts and to the disadvantage of the third class districts, where the cost of maintaining schools of an equivalent standard is usually greater than in the first and second class districts. This is because there are necessarily employed in country districts a larger number of teachers in proportion to the number of children than in city districts. . . . If the county money were distributed also on the basis of the number of teachers employed, third class districts would receive from the county fund on the whole an amount greater than that contributed by them.

<sup>94</sup> *Report of the Colorado school system*, pp. 36-37.

The contrary is the case.<sup>95</sup>

*Basic principles of a scientific and just method.*—A method of apportioning school moneys which was fairly satisfactory amid the simplicity of social and economic conditions of earlier days will no longer suffice. The complexity of our social and educational situation demands a more complex method. Such a method must take into consideration not one or two but several factors in the educational situation. It must rest primarily upon clearly defined aims and conceptions. It must be such as to favor the poorer and more helpless school units rather than the richer and more capable. In determining the amount of state aid to be granted to any school unit, consideration must be given to the following facts at least: (1) actual school attendance; (2) length of the school terms; (3) number and grade (as indicated by the grade of certificate, or by the professional training) of the teachers employed; (4) valuation of local unit; (5) local school tax. The requirements upon which such a grant should be conditioned have already been discussed.

*Fundamental defects in current method of school support.*—Despite the fact that Colorado has enormous school revenues at her command, educational opportunities and burdens have long been and still are disastrously unequal. The policies employed for providing school revenue not only in Colorado but also in many other states of the Union are a direct though unconscious outgrowth of the charity conception of education. Instead of attempting to determine accurately in advance by scientific methods how much money will be needed (1) to guarantee that every child of school age shall be in school, and (2) to insure proper school facilities to every such child, nearly all our states, and the school units within them, set aside what appears to be a goodly array of sources of school revenues. This done, they collect each year more or less completely the revenues which these sources furnish. Then, to the school authorities, they say in substance, "This year you have . . . dollars. With this you must maintain your schools." It would be difficult to imagine a more unscientific or a more disastrous method. Its results are evident in the inexcusable and wickedly unjust variation which we find existing between both communities and states.

<sup>95</sup> *Ibid.*, p. 44.

## CONCLUSIONS

*National funds and federal authority as remedies for existing inequalities.*—In 1917–1918, whereas Montana's average expenditure per child in attendance was \$80, Rhode Island's was \$47, and Mississippi's \$12. Again, whereas in Montana the average number of days of schooling per child was 131, in Texas it was 79 and in Louisiana only 53.<sup>96</sup> It is impossible to contemplate the conditions which such data bespeak without asking whether the states in our Union ought not be held responsible to some authority outside themselves for the discharge of their educational responsibilities. Our federal government has left to the states the provision and care of education. To insure the satisfactory fulfillment of these functions by the states, or at least to aid the states in fulfilling them, the federal government has given to the states out of its own wealth vast fortunes in lands and money. The aim of these gifts was to make education universal, free, and equal. All data at hand show conclusively that not one of these aims has been realized in a single state. As long as education continues to be administered under the conception that it is a state and not a national enterprise, so long will thousands of children in many of our states be deprived of their educational birthright. As in any efficient school system, the county holds each district responsible, and the state holds each county responsible, so sooner or later must the nation be able either to hold each state responsible for properly discharging its educational responsibilities, or to furnish sufficient incentives and pressure to induce every state in the Union to furnish proper educational facilities for all its children.

It lies without the scope of the present study to undertake to outline the steps by which such a revolution in the administration and support of our schools is to be accomplished. It must undoubtedly be brought about by an educative process, rather than by a sudden drastic attempt on the part of the federal government to force its way into the control of state systems of schools. The two steps which should undoubtedly be undertaken first are embodied in the Smith-Towner Bill, at the time of this writing awaiting action by Congress. It includes the establishment of a national department of education and the creation of a national

<sup>96</sup> *Statistics of state school systems, 1917-18*, pp. 69, 108.

educational fund to be employed in equalizing the burdens and opportunities of our states. Even if this bill should fail to become a law, it is unthinkable that its aims should not ultimately be reached.

If the Smith-Towner Bill to create a federal school fund fails, one might inquire why the beginning of a national school fund should not be made by recalling the twenty-eight millions of surplus revenue loaned to the states in 1837. The principles in accordance with which such federal aid should be distributed among the states would be largely the same as those in accordance with which states should distribute aid among their constituent units. Federal as well as state, minimum, educational standards should be formulated. States should be given a reasonable period of time, not to exceed five years, during which to meet such standards. States failing to meet these standards within the set period should be compelled by federal authority, or by public opinion which is the source of federal authority, to levy a state school tax, the proceeds of which, together with all other funds including the special federal aid, would be sufficient to provide educational facilities satisfying the national standards.

If such a policy were adopted, it would no longer be true that a child's chance for securing an education and the quality of the education secured would depend upon whether he were born in Mississippi or in California, in Baca County, Colorado, or in Sedgwick. His opportunity for an education and the assurance that the education given would be given under wholesome and helpful conditions would depend upon the only thing upon which they should depend in a fabulously rich democracy, namely that he was a child of the republic and a citizen in the making.

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## Editorials

### CRUMBS OF COMFORT

It may be assumed that every human enterprise has its following. Back of every endeavor, however trivial, is the conviction of at least a few that it is worth while. Its friends, although they may not be numerous, may support each other more effectively than a host of less consecrated followers. Under these circumstances a member of an association for improving this or preventing that may easily mistake the approval of a handful for the plaudits of thousands. He may even develop a protective scorn for the applause of the crowd—for what Doctor Chalmers called “the hosannas of a driveling generation.”

We do not wish to make these mistakes, and as we lean backward in an attempt to stand straight, we try to be coldly critical. In particular, we examine the many fine things people are saying about our Journal and we speculate as to whether they arise from conviction or a desire to please. Of course, even in this mood we hope they arise from conviction. But the mood simply won't hold. We realize with humility that even if our friends merely desire to please us, they succeed admirably. The real fact must be admitted. We like to have folks say nice things about us. We are like Lincoln—though not very much like him—who, when Judge Douglas persisted in sarcastically referring to him as “the amiable gentleman from Sangamon County,” remarked that he enjoyed flattery; in fact, that in regard to flattery he was like the Hoosier in regard to gingerbread who declared that he thought he liked it better than any other man in the world and got less of it.

Possessing these altogether human but not generally avowed characteristics, and being rather inclined to believe that our friends, though constituting but a “few cases,” are, nevertheless, a random sampling from a total population—possessing these characteristics and having such a belief, we were astonished to receive recently from one of our English correspondents the following statement with reference to our Journal: “What amazes me

is that there should be money and interest enough in America to make such a venture possible." Money enough! We rather supposed that the European notion of America, however belittling otherwise, contemplated a rather disgusting degree of wealth. And interest! Employing a vernacular which our English friend may have to look up, where do you get that stuff? If educational research from transatlantic quarters is sufficient to make American interest in it seem questionable, we have failed utterly to locate its source of supply. Our correspondent, moreover, is not ill-informed, at least not in other respects, but his amazement is—well, amazing.

Of course, we wrestled with something like this question at the time the JOURNAL OF EDUCATIONAL RESEARCH was being organized. We very much wanted to know whether there was "interest enough in America to make such a venture possible." As to money, we weren't so much concerned about the amount in America as we were in the amount that could be diverted to the purchase of our periodical. We proved to our own satisfaction that the interest already existed, and we had faith to believe that the money would be sufficient to finance the undertaking.

In spite of the erroneous belief—reasonable enough at the time—that prices of publication were at the peak last January, our friends will be glad to know that we have come through with an impressive justification of our faith and of theirs. But at first it was not altogether easy even to convince some of our friends. One conscientious objector was reluctant to cast in his lot with us because he feared that not enough good copy could be obtained to sustain such a periodical. It seems, however, that research workers have been particularly active in recent years, and that at the same time facilities for publication have become more and more meager. Interest in research has been evinced, not only by an increased volume of material suitable for publication, but also by an enlarged reading public—a public which, not content with merely reading our articles, has the amiable habit of telling us how much it enjoys them.

Naturally, we like to think all this is because of the real worth of our Journal, and we are not without evidence that this may be the case. For example, not long ago we applied for the privilege of exchanging with an important periodical. The editor, to whom



we had applied, wrote saying that he was glad to make the exchange; and then he added, "We have an absolute rule against such exchanges and your publication will be the only one on our list."

When to the smiles of a band of enthusiastic friends is added the handclasp of an "esteemed" contemporary, we sigh with satisfaction, and unchallenged we allow to steal into our mind the notion that we have arrived.

Crumbs of comfort!

B. R. B.

### ON OBJECTIVES IN READING

In a recent issue of an educational periodical which maintains a "Question and Answer Department," the following were published:

*What are some of the standards by which I may judge good reading in the eighth grade?*

(a) Ability to speak clearly and correctly in a well-modulated tone so that the listener hears, comprehends, and feels what is said.

(b) Ability to show through voice quality and control that the reader has grasped the essential thought in the selected reading.

In view of the fact that silent reading has received much emphasis during recent years through the use of silent reading tests and in other ways, it is surprising, if not astonishing, to find the above question answered entirely in terms of oral reading. Until teachers incorporate in their conception of the objectives to be attained in the teaching of reading the idea that, after the pupils pass above the primary grade, silent reading is the most important elementary school subject, and also until teachers realize that the type of reading instruction which has been given in our schools (and appears still to be given in some localities) will not effect that objective, our schools cannot hope to attain a high level of efficiency. When a pupil has his attention centered upon speaking clearly, correctly, and in a well-modulated tone and when he knows that both the teacher and other members of the class are paying attention to his reading primarily to discover errors which he may make, he cannot be expected to give attention to the meaning of what he is reading. Furthermore, he can never learn to read rapidly. As a result he will enter upon his work in high school and college with a distinct handicap.

W. S. M.

## AVERAGES

Not long ago after we had addressed a splendid audience, a discussion took place, and in the course of it one of the school men raised the question of the value of an average. From the conversation that ensued it was apparent that he entertained some hostility to it. This is an attitude which we have encountered before, and it seems to us unfortunate.

The critics of the average as a valuable device propound such problems as the following: There is one man in a village of 500 persons whose fortune amounts to several million dollars. None of the rest is of more than moderate means. Is the average wealth per person in the community worth anything? or again: Professor A teaches two classes, the first of one hundred students and the second of four students. The average size of a class is fifty-two. Does this average have any meaning?

In the first place we wish to observe that the term "average" has a general meaning. It is not merely the arithmetic mean—not merely, in other words, the sum of the measures divided by their number. All measures of central tendency are properly called "averages." This includes the median, the mode, the arithmetic mean, and various other means. A criticism which contemplates only one of these averages is unintelligent. The median is an average which would very nicely take care of the problem of the small village containing the multi-millionaire. It would give no more weight to his fortune than it would to any fortune larger than the middle one.

Moreover, an average is not worth very much when derived from a very few measures nor from measures that are widely scattered. Nobody, for example, is interested in knowing the average size of Professor A's two classes. It is much more satisfactory to say that he teaches one class of a hundred and another of four students. Indeed, the reliability of an average depends upon but two considerations—the number of measures and their dispersion. The critic of the average is therefore basing his criticism on the most extreme case when he proposes the smallest possible number of measures (two) and assumes them to be widely separated.

Yet there are conditions under which the average is useful even when derived from two measures. If Professor A taught two

classes as widely different in size as we have indicated and it were possible to equalize them, we should do so on the basis of as close an approximation to fifty-two students per class as possible. An interesting example of this sort of use of the average may be shown. The army psychologists found that the distribution of mentality in various regiments was markedly different. Two regiments in the same organization are mentioned by Yoakum and Yerkes. The first had 1 percent of its membership in class A (very superior intelligence) and 3 percent in class B. The second had 6 percent in class A and 12 percent in class B. Similar differences existed for other grades of intelligence. The psychologists suggested a "balanced distribution of intellectual strength." They did so on the basis of the arithmetic mean. In other words, they suggested that each regiment be organized so that 3.5 percent of its membership should be of A intelligence, 7.5 percent of B intelligence, etc. It is clear that no better basis could be suggested than this because it produces equality.

With respect to large numbers of measures, the truth is that the human mind insists upon having some one portable figure which can stand for the general weight of series. If we obtain the scores of children in a rate of reading and we wish to express a group result, we can best do it by the means of an average. Those who object to this procedure do so in something like these words: "One child reads at the rate of 200 words a minute and another at the rate of 150 words a minute. The average is 175; but neither child reads 175 words per minute. The average is therefore a false statement of the achievement of these children." The reply is that 175 does not purport to be a child's speed of reading. It purports to show the achievement of the group as a group. Care must be taken, then, to give to the average the meaning which properly belongs to it.

In the case we have just cited, the group consisted of but two children and the conditions in respect to the number of measures were again as unfavorable as possible. Other things being equal, if there were eight children in the group the reliability of the average would be twice as great; and if there were eighteen it would be three times as great. Evidently a criticism of the average must take account not only of the number of measures out of which it arises but also of the use which is to be made of it, and the meaning which attaches to it.

It is not too much to say that the conception of average enters into all our thinking. It is as idle to quarrel with the idea of average as to quarrel with the idea of any other middle course. Lloyd George in a speech on October 8, after declaring that the great issue was peace, continued: "The only way to reach such peace is to take the middle course, especially at this moment because you get the antagonism of extremes from both sides." This is the argument for a coalition government. Extreme radicals and extreme conservatives, extremists in short of every type, do not like compromise. They are for an out-and-out policy. But the common sense of the rest of the world seldom gives them an opportunity to carry such a policy into effect.

In recognition of the value of an average as a guide to conduct, we have the phrase "the golden mean." We apply the notion everywhere. We are applying it today, for example, in the measurement movement, for we are accepting neither the scoffer nor the enthusiast as a worthy guide. We apply it in our thinking, as indeed we must if we think at all; for the concept is itself a kind of average in which the measures are observations, the computer is an experiencing nature, and the result a generalization. We apply it in business and the daily round of duties. An in-between attitude is commonly felt to be truer than an extreme position in any direction. Hence the compromise and the give-and-take of life. The average is not as spectacular as the extremes; but it is safer and it is indispensable.

B. R. B.

## Reviews and Abstracts

LINK, HENRY C. *Employment psychology*. New York: Macmillan Company, 1920. 440 pp.

As its title implies, this book presents the theory and practice of psychology applied to the selection, training, and grading of employees. Part I is devoted to a discussion of psychological tests; Part II to trade tests and other applications of employment psychology; Part III to selection and retention of employees; Part IV to conclusions.

The book is extremely well written, and the argument is convincing. Although the method developed is scientific and technical, the language is such that any layman may expect to read the book with understanding and profit. Indeed, such an example of clarity in psychological writing might well be brought to the attention of the younger generation in our colleges as an ideal toward which to strive.

The author has been careful in his claims for his findings. In fact, as is pointed out by Professor Edward L. Thorndike in his introduction, the story of the experiments is more conservative than needs be, for the author could have obtained even better prediction of success at a given job than he did obtain, by applying the technic of partial correlations and the regression equation.

An appendix contains a list of forty-one tests used by the author, with complete explanations of the general procedure of giving them and the method of rating. Among these are tests for factory inspectors, clerical help, typists, stenographers, comptometers, tool makers, and gunsmiths.

The author's chief contribution to the subject of employment management is his treatment of method rather than the tests as such, together with his recognition of the fact that jobs and positions in industry are based not so much on *degrees* of intelligence as upon *kinds* of intelligence or ability. "To be sure, every kind of ability has degrees; but it takes much finer tests than general intelligence tests to determine what these are." A technical man may possibly find even Dr. Link's trade tests of too coarse a mesh for the purpose intended.

The book is to be recommended highly to all those interested in the application of more science to the problem of selection, training, and grading of employees.

IRA S. GRIFFITH

BRANOM, MENDEL E. *The project method in education*. Boston: Richard G. Badger, The Gorham Press, 1919. 282 pp.

The project method in education has at least two sets of proponents and one of opponents. Of the former, one group maintains that the term project should be restricted to fields where concrete objective achievements are possible while the other would concede the possibility of purely intellectual projects. The principal argument of the opponents is that the project method is not a contribution to education but is merely good teaching camouflaged.

No matter to what camp the educator belongs, he will find Mr. Branom's book of interest especially from the historical viewpoint. The literature of the project is

scattered through various periodicals, circulars, and N. E. A. proceedings. Mr. Branom has brought together and evaluated all of this material in his chapter on the "Evolution of the Project as an Educational Concept."

The author is catholic in his views and sums up what he terms as futile attempts to restrict the use of the term *project* as follows: "When the attempt has been made to recognize the project as a special lesson type, all other types have not been justified except in so far as they contributed in some important fashion to life's projects. The various other types consequently are seen to be inseparably and inextricably integrated with the so-called project, which accounts for the inability satisfactorily to use the term project in a restricted sense. This integration and constant expansion of the term to cover the various lesson types suggest the need of using the term as a concept that includes all intellectual growth and therefore all types of lessons. In fact, the various lesson types, if properly presented, are ways of getting at that type of development that differentiates the human being from other animals, and the one method of growth, whether considered generically, historically, or on the basis of present educational usage, properly may be termed the project method."

The reader may gain the impression that the writer feels it to be necessary to justify the project as the educational vehicle par excellence. The chapter on "The Relation of the Project Method to Instincts" is a case in point. Here Mr. Branom calls educational psychology to his aid to show that "it is through the project method that the hopes of the civilized world are realized."

One might criticize the author's arbitrary classification of project-types, into the question project, exercise project, problem project, and complex project, although it may be excused on the ground of the propagandist's need for dogma. In succeeding chapters, each of these types is described and discussed.

Other chapters deal with the project method in history and geography respectively. These will prove of great practical value to the teacher. The two concluding chapters deal with the reorganization of the curriculum and the preparation of teachers for project teaching. In the first of these, the author has indulged in the types of glittering generalities which have been much in vogue, but without giving any specific suggestions. The same criticism may be made of the last chapter. One point, however, is made by the author, which seems to the writer to be of first importance, namely that the project enthusiasts are mistaken in claiming that the project method should teach itself. Mr. Branom believes that even better trained teachers will be required. His argument that in normal school, college, or university classes where a prospective teacher must quickly and comprehensively cover a field of knowledge, the project method should not be used, may seem a little out of place in his general thesis.

While the author may seem to go rather far afield in his academic discussions and to be "serving old wine in new bottles," the charges are after all not serious. The teacher, who is a project enthusiast, or his sister or brother, who is embarking for the first time on the educational sea and the old educational "salt" who likes his plum duff served up in new ways, will all find the book an interesting addition to the professional library.

JAMES H. GREEN

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Walter S. Monroe, University of Illinois, Urbana, Illinois.

**Tests by the U. S. Bureau of Education** The United States Bureau of Education announces a group of predetermination tests for ability in foreign languages. These tests are being worked out by Professor Handschin of Miami University, Oxford, Ohio, under the direction of the Bureau of Education. It is the hope of Professor Handschin to secure a test which will aid in classifying pupils who are beginning the study of some foreign language.

**Superintendents' Conference** On November 17 and 18 the Bureau of Educational Research of the University of Illinois will hold a Superintendents' Conference. This meeting occurs for the first time this year. The High School Conference—an annual meeting of long standing—meets during the same week. The superintendents will be addressed by Professor Charles H. Judd and Professor M. E. Haggerty. It is hoped to make the Superintendents' Conference an annual gathering devoted to the reporting of educational investigations.

**Pennsylvania Educational Congress** Doctor Thomas E. Finegan, State Superintendent of Public Instruction for the Commonwealth of Pennsylvania, has announced that the second annual session of the Educational Congress will be held at Harrisburg, November 11, 12, and 13. The Congress is called again this year with the cordial approval of Governor Sproul.

This Congress will devote its time to the consideration of the report of Colonel Leonard P. Ayres of the Russell Sage Foundation on the evaluation of state school systems. Doctor Finegan stated, in announcing this session of the Congress, that he believed the educational workers and people of the state desired to know the exact points in which the school system of the state is not progressive in order that such remedial action may be taken as appears necessary to make the school system of Pennsylvania conform to the generally accepted modern and efficient standards.

Governor Sproul will preside at the opening session and will make an address.

Colonel Ayres, who directed the work in connection with the evaluation of school systems of the several states and who prepared the report which is to be considered, will attend the Congress and will deliver the principal address at the opening session.

An advisory committee will be selected to aid in the preparation of a program which shall cover the three days' session of the Congress.

The Bureau of Educational Research of the University of Illinois is cooperating with the school officials of the city of Chicago on a project to determine the effect of size of class on efficiency of teaching. Eight schools have been placed at the disposal of the Bureau of Educational Research in conducting this investigation. One hundred thirty-two classes are participating, and consequently, 132 teachers; the number of pupils involved is about 4,500. In the elementary school, classes of the second, fifth, and seventh grades have been selected, and in the high school, classes of the second year. The second grade is taken as typical of primary conditions, the fifth as typical of intermediate classes, and the seventh as typical of advanced grades.

**Size of Class  
and School  
Efficiency**

The experiment is being conducted under the personal direction of the director of the bureau with the assistance of Mr. P. R. Stevenson, who has lately been appointed research assistant. Eleven conferences have been held in Chicago with the superintendents, principals, and teachers. As a result of these conferences principals and teachers have been instructed in the procedure to be followed in conducting the experiment and in the method of administering the tests on which the data will be based. These tests are to be given on six successive days, beginning with October 6.

The feeling is shared both by the Chicago people and by the Bureau of Educational Research that this experiment is highly significant, and is likely to yield important evidence on the question of the influence of size of class on teaching. Moreover, this question is administratively of profound importance. Studies of the cost of teaching have shown that of all the factors to be considered, size of class has greatest influence. If, without detriment to the instruction, the prevailing size of class in a given school system may be raised by as many as five children, the number of teachers required to do the work will be materially decreased. This would effect a saving not only in salaries but in physical plant and equipment. If, on the other hand, a decrease in the sizes of classes in a given school system will be unquestionably accompanied by a substantial increase in opportunities for boys and girls to secure better training, then the question of expense may become secondary.

From another point of view the problem resolves itself into this: With a given amount of money at the disposal of a board of education for teachers' salaries, is it better school management to provide for a relatively few well-paid teachers who instruct relatively large classes than to provide for a relatively large number of lower-paid teachers instructing smaller classes? In other words, is it better policy to employ a few good teachers or many poor teachers?

The Chicago experiment will be conducted for at least a year. It is hoped that not only the school system of Chicago, but also school systems throughout the state and the nation may be benefited by the findings.

Seldom in so short a time does any subject attain the prominent place that educational measurement has gained in the field of education within the past decade, indeed mostly within the last five years. Ten years ago the idea of scientific, standardized tests and scales was in its very infancy, five years ago it had but gained a foothold,

**University, College,  
and Normal School  
Courses in Educa-  
tional Measurements**

now it occupies a large place in educational thought and literature. This development is well marked by the amount of time and attention given to courses in this field by the various institutions that offer work of collegiate rank. The study herein reported was made with the purpose of revealing the present status of the movement.



A request for a 1920 summer session bulletin was sent to each institution listed in the United States Bureau of Education Directory. Replies were received from about 70 percent of those listed. These include almost all schools having more than local fame and standing. It is probable that those institutions for which no data are at hand do not, on the average, offer as much work in this line as those studied, since their average size is considerably less.

The schools studied were grouped thus:

- Group I. State universities
- Group II. State normal schools
- Group III. Other state schools
- Group IV. Non-state universities
- Group V. Non-state colleges
- Group VI. Non-state normal schools.

It is doubtless true that in many cases some attention is given to educational measurements in courses whose titles or descriptions do not indicate this content. In this study an institution was counted as offering work in educational measurements only if the title of the course or its description explicitly indicated this content. The explicit recognition of educational measurements by these institutions is shown by the following table, in which the Roman numerals indicate the groups to which the institutions belong:

	I	II	III	IV	V	VI
No. of schools offering work in measurements . . . . .	29	37	5	14	8	0
No. of schools not offering work in measurements . . . . .	5	34	14	17	54	16

It is apparent that state universities are well in the lead, with state normal schools second. As the institutions of Group III are largely agricultural, professional, etc., it is not surprising that so few offer this work. When we consider that almost all collegiate institutions claim to train teachers it is surprising that no more than 45 percent of the non-state universities, 13 percent of the colleges and none of the private normal schools offer this work. The fact is that state universities and normal schools (with some of the younger non-state universities) are leading in this movement, while such long-established centers of learning as Yale, Princeton, and Dartmouth do not offer a single course in this field, but repeat the history of educational progress along many lines.

In this connection it is interesting to note that a study of offerings in Education for the year 1915-1916 showed that only 10 of the 37 state universities studied were offering courses in educational measurements at that time. Along with these were a very few other universities and several normal schools.

The next table shows a few further facts, for each of the five groups of institutions which offer courses in measurements.

	I	II	III	IV	V
Average number of courses per school . . . . .	1.8	1.4	1.0	2.5	1.3
Average number of semester hours per school . . . . .	3.8	3.0	2.3	5.7	3.1

The chief point here is that, as a whole, these non-state universities which do offer such work are well in the lead in the amount offered. Their average does not, however, represent the typical institution of this group as the presence of the University of Chicago, with eight courses, Stanford University and Teachers College, Columbia with five each very greatly raises the average. Without these three it would be lower than that of the state universities. Here Illinois and Michigan lead with five courses each, as also has Colorado State Teachers' College.

The study of 1915-1916 referred to above showed an average of 1.2 courses and 3.0 semester hours for the ten state universities giving such work.

An analysis of the courses offered according to content shows the following number of courses of each kind:

Group	I	II	III	IV	V
1. Intelligence Tests: elementary course . . . . .	10	6	0	7	2
2. Intelligence Tests: advanced course . . . . .	2	1	0	0	0
3. School subject tests: elementary course . . . . .	18	20	2	9	4
4. School subject tests: advanced course . . . . .	0	1	0	2	0
5. Both kinds of tests: elementary course . . . . .	4	9	1	4	2
6. Both kinds of tests: advanced course . . . . .	0	1	0	1	0
7. Tests and statistics . . . . .	7	3	0	2	1
8. Other courses which include tests . . . . .	11	11	2	10	1

Under No. 3 a few schools list separate courses dealing with elementary- and high-school subjects. No. 8 includes such courses as educational psychology, administration, surveys, educational literature, etc., where the descriptions show that educational measurements is a part of the course.

C. W. ODELL

### Some Correlations Between Otis Scale and Rogers Mathe- matical Tests

In January 1920, a selected group of pupils of the Champaign High School were given the Otis Group Intelligence Scale and the Rogers Mathematical Tests. This group of pupils had studied mathematics in the high school for one semester or more. When the tests were given at the close of the first semester they were considered to be failing in mathematics.

From the results secured a number of correlations were computed, which are presented herewith. The 39 pupils (5 freshmen, 21 sophomores, 11 juniors, 2 seniors) who took both tests were slightly above the average in general intelligence as their C. B.'s<sup>1</sup> show. The latter were distributed as follows:

C. B.'s.....	65- 74	75- 84	85- 94	95- 104	105- 114	115- 124	125- 134	135- 144
No. Pupils.....	2	2	6	9	9	7	3	1

A number of the pupils did not take all of the Rogers tests. No one took fewer than three of the six, while most of the pupils had four, five, or all of them. Not one of the tests was taken by fewer than 32 of the 39 pupils. To obtain the general Rogers score, scores in the various Rogers tests taken by each pupil were weighted and averaged. For this composite Rogers score and the Otis point score,  $r = 0.41 \pm 0.09$ .

The magnitude of this coefficient of correlation together with the fact that practically none of these pupils are carrying work in mathematics successfully, indicates that the failure to do successfully secondary mathematics depends upon some factors other than general intelligence. This is even more clearly shown in the correlation tables. It is probable that the attitude of the pupils toward mathematics is a potent factor. It is also likely that diagnosis and remedial instruction might have assisted a number of the pupils. On the other hand it may be that mathematics requires a special type of intelligence and that the scores secured by the means of general intelligence tests can be used only for a general survey of pupils with respect to their probable success in mathematics.

It was thought that the correlation between tests 5 and 6 (Arithmetic and Geometrical Figures) of the Otis Scale and the Rogers tests would be rather high; but only a moderate degree of correlation was found, although higher than for the general Rogers score. The Rogers tests with the scores in Otis tests 5 and 6 combined gave  $r = 0.54 \pm 0.08$ ; with test 5 (Arithmetic) alone  $0.53 \pm 0.08$ ; and with test 6 (Geometrical Figures)  $0.41 \pm 0.09$ . It had been expected that the highest correlation found would be between the Rogers Geometry Test and the Otis test on Geometrical Figures. In this case, however,  $r = 0.35 \pm 0.10$ , showing but a low degree of correlation.

Correlations were computed between the total Otis scores and those on each of the Rogers tests. They are as follows:

Otis with Rogers	Algebraic Computation,	$r = 0.37 \pm 0.10$
" "	Geometry	$r = 0.17 \pm 0.12$
" "	Interpolation	$r = 0.58 \pm 0.08$
" "	Superposition	$r = 0.02 \pm 0.12$
" "	Mixed Relations	$r = 0.47 \pm 0.09$
" "	Trabue Language, L. & M	$r = 0.52 \pm 0.09$

It will be observed that the Interpolation Test shows the highest degree of correlation with general intelligence as revealed by the Otis scale, whilst Geometry and Superposition seem to have no relation thereto. Of course, the number of pupils tested was

<sup>1</sup> The C. B. (coefficient of brightness) is similar in meaning to the I. Q. In this report it may be given the same meaning.

too small to be at all conclusive, but the results at least indicate a probability that certain correlations and absences of correlation exist.

WALTER S. MONROE

**Effect of Grade Distribution upon Coefficient of Correlation**

In interpreting the coefficient of correlation between two traits, it is not generally recognized that the manner in which pupils are distributed among the different school grades is a potent factor in determining the magnitude of the coefficient. Recently the Bureau of Education had the Illinois General Intelligence Scale given to a considerable number of pupils in grades II to VIII. The coefficient of correlation between the scores upon the intelligence scale and the chronological ages was calculated for each grade separately and for all grades combined. The resulting coefficient and the number of pupils upon which they are based are given in the table below:

CORRELATION BETWEEN GENERAL INTELLIGENCE AND CHRONOLOGICAL AGE

Grade	No. Pupils	<i>r</i>	P. E.
II	110	-.12	.063
III	927	-.06	.022
IV	1,088	-.20	.019
V	1,146	-.22	.019
VI	1,625	-.22	.016
VII	1,762	-.24	.016
VIII	1,285	-.26	.018
All grades	7,943	+.55	.005

The coefficients of correlation for the several grades are all negative. In grades II and III the coefficient, when compared with the P. E., is so small that it can be interpreted only as indicating no correlation. In all the other grades, the coefficient of correlation, while small, is large enough to be significant. The negative correlation shown is in agreement with other investigations covering this point.

The coefficient of correlation for all grades combined is positive and large enough in comparison with its P. E. to indicate a very distinct positive correlation. This, again, is in entire accord with other investigations of the correlation between the general intelligence and the chronological age of pupils when a number of school grades were combined.

We have in this table a very striking illustration of the effect of using data secured from pupils belonging to more than one grade. When taken separately by grades the traits concerned here yielded negative coefficient; when combined, the coefficient is positive. This indicates the great necessity for investigators to exercise due care in interpreting the coefficient of correlation that may be obtained. Very clearly, one can obtain widely different coefficients of correlation by using pupils that are distributed differently among the several school grades.

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## A GROUP INTELLIGENCE EXAMINATION WITHOUT PREPARED BLANKS

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The extensive use of group intelligence tests bears witness to the values which can be derived from their application. All the tests in present use necessitate the purchase of prepared blanks for each pupil. Those of Otis, Thorndike, Haggerty, Thurstone, Dearborn, and Chapman and Welles may be cited as examples. The cost of administering these tests varies from approximately four cents to eighty cents per pupil. While those who are acquainted with the tests would readily assert that a few cents for each individual examined could hardly be spent to better advantage, yet taking conditions as they exist many school systems hesitate to use them owing to the financial outlay. For example in a situation which came to the author's attention where it was distinctly desirable to test sixteen hundred children, the authorities did not see their way clear to spend the necessary \$80 to \$160 for blanks which could only be used on a single occasion.

The question has often occurred to the author as to whether it was possible to construct an examination: (1) which would be reasonably reliable and valid; (2) which could be given to groups of thirty to fifty children; (3) which would involve merely paper and pencil; (4) which could be corrected by having the pupils exchange papers; and (5) which would not consume more than one hour for administering and correcting. This study briefly describes a tolerably accurate instrument<sup>1</sup> which has been devised to meet these conditions for upper grades and for high school. In view of the fact that the major portion of group testing concerns itself merely with the differences within the group and not with external comparison, the present form of examination may well be used in cases where for one reason or another it is not feasible

<sup>1</sup> Copies of this test, in any number, can be obtained, for twenty-five cents, from the author at the Department of Education, Yale University, New Haven, Connecticut.

to test in the more expensive way. The meticulously scientific reader may console himself with the thought that it is obviously better to use a slightly less flexible and exact instrument than no objective measure at all.

The first section presents a very short description of the construction of the test together with full directions for administering and scoring. In the second section there will be found statistical and other justification for the use of an examination of this type.

## SECTION I

The test is made up of one hundred elements or items distributed as follows:

Information.....	25
Arithmetic.....	25
Opposites.....	25
Sentence Understanding.....	25

Other kinds of test, particularly directions and various forms of memory, were experimented with but they failed to justify themselves.

The elements of each of the tests were tried out on two groups: (1) the brightest ten children of grade VIII in a typical school containing 120 children in the grade; (2) the dullest ten among the same 120 children. The grouping was based on a combination of teacher estimates and school marks. Every test element that failed to be answered by some of the brightest group, that was answered by all the lower group, or answered by a greater or equal proportion of the duller than of the brighter group was eliminated. Each part of the test consisted finally of 25 elements, of various degrees of difficulty arranged at random. The time allowances were eventually fixed after the author and others had derived experience from giving the test to several hundred children.

## GENERAL DIRECTIONS

### *Preparation*

Use paper ruled on both sides.

Instruct the pupils to fold the paper twice from top to bottom thereby forming three equal rectangles.

Instruct the pupils to number, line by line, from one to a hundred, passing down the whole length of one rectangle before going on to the next one and using both sides of the sheet. Have

the numbering done as near the edge as possible in order to leave the maximum amount of room for writing answers.

### *Explanation*

1. Explain to the pupils the general nature of the test.
2. Tell them to do their best, and also inform them that the class is going to mark the papers at the close of the examination. Warn the pupils to keep their papers from the view of those around them.
3. In giving the test read each question as carefully as you can in a manner calculated to give the children the best possible chance.
4. If the pupils are writing the answer to the previous question do not attempt to make them stop writing as you dictate the next question. Go straight ahead with the examination. The pupil who falls behind and works slowly will handicap himself if he gets so much behind that he cannot give his undivided attention to the coming question.
5. Let the whole procedure be as automatic as possible. It is well to practice on a small group before trying large groups.

### I. INFORMATION

Tell the pupils that 25 simple questions are to be asked, and that to each one of these questions they must write the answer, one word or figure as quickly as possible. Great care must be taken to see that the answer is written opposite the number which corresponds to the question. If they do not know the answer, **they must draw a dash** and wait for the next question. Dictate each question *once and once only*.

Give the pupils clearly to understand that the question will be given once, and that if they do not get it, they must not hold up their hands but draw a dash and wait for the next question. Tell them not to get discouraged if at any time they get muddled, but simply to wait for the next question.

After dictating a question let ten seconds elapse measured by counting ten to one's self at an even rate previously learnt by counting against a watch. (NOTE. Most examiners will tend to count too rapidly unless they check up their speed before they start by counting with a watch.) Then proceed to the next question. Always call the number of the question with the question itself.

## INFORMATION TEST

1. In what month does Independence Day come?
2. What is the commonest fuel used in the automobile?
3. Who wrote "Evangeline"?
4. How many quarts are there in a peck?
5. What general surrendered at Appomattox?
6. In what country are the Pyramids?
7. From what animal does venison come?
8. What is the commonest make of automobile in the U. S.?
9. With what instrument is temperature usually measured?
10. How many amendments are there to the Constitution?
11. How many red stripes are there in the U. S. flag?
12. In what year will the next leap year come?
13. Into what tree does the acorn grow?
14. In what month was the armistice signed?
15. Who was the commanding admiral of the U. S. Navy during this last war?
16. What is the plural of tooth?
17. In the Bible story, whom did David kill by throwing a stone?
18. What is the feminine of shepherd?
19. For what article of consumption is Postum a substitute?
20. What is the normal temperature of the body?
21. What famous product is made by Wrigley?
22. How do you write 112 in Roman numerals?
23. Who is supposed to have discovered wireless telegraphy?
24. What is the technical name applied to a foreigner residing in the U. S., who is not naturalized?
25. What do the letters "A.B.," written after a man's name, stand for?

## II. ARITHMETIC

The procedure is the same as in the information test, with the one exception that the question is read *twice*. Thus read the number of the question and the question *twice* and then count five silently and pass on to the next question. Let pupils have a rough sheet for figuring.

## ARITHMETIC TEST

26. A house rents for \$128 for 4 months. How much is the yearly rent?
27. A Ford runs 18 miles on a gallon of gasoline. How far will it run on  $5\frac{1}{2}$  gallons?
28. How many pencils can you buy for 60 cents, at the rate of 2 for 5 cents?
29. A boy's suit is bought for 12 dollars and sold for 18 dollars. After allowing 3 dollars for expenses of selling, how many dollars profit?
30. If a train travels half a mile in a minute, what is its rate per hour?
31. What number, multiplied by 7, gives a product of 28?
32. What number doubled is half of eight?



33. A salesman showed a motorcycle at \$75. The customer asked to be shown something 20% cheaper. What must its value be?
34. A certain candidate obtained 55% of the votes. There were 500 votes. How many votes did the candidate obtain?
35. If it takes 4 men 3 days to dig a drain 120 ft. long, how many men are needed to dig it in half a day?
36. How many hours will it take a truck to go 42 miles, at the rate of 4 miles an hour?
37. What is the interest due on \$400 at 3% for 2 years?
38. A group of girls walks 7 miles east and 3 miles west. How far were they from the place of starting?
39. At the rate of \$4 for an 8 hour day, how much is due a man for 32 hours of work?
40. In buying a house for \$4,500 I pay 20% down. How much is left to pay?
41. A man had 11 cigars. He smoked 7 and then bought a number, equal to those that were left. How many had he finally?
42. I buy 3 articles, each costing \$1.33. I hand the clerk a 10 dollar bill. What change should I get?
43. If an aeroplane goes 250 yards in 10 seconds, how many yards will it go in one-fifth of a second?
44. If there are two tanks, one double the size of the other, and both tanks together hold 12 gallons, how much does the smaller hold?
45. A rectangular plot of ground measures 50 feet one way and 100 feet the other. What length of fencing will go around the plot?
46. What number, when added to 21, makes one-half of 58?
47. How long will it take two trains, just meeting, both travelling at 30 miles per hour, to be 120 miles apart?
48. What number, when squared, is  $\frac{1}{4}$  of 100?
49. If a man is paid 1 dollar an hour for ordinary time, and double for over-time, how much should he be paid for 16 hours, 8 hours being ordinary time and 8 hours over-time?
50. If John gets 4 dollars 30 cents, and Mary gets half of that, how much do they both get together?

### III. OPPOSITES

Write the following words on the board:

Up

Asleep

Long

West

and have the pupils give opposites.

Explain to the pupils that you are about to read a series of words, and that each word will be read once and once only. They must not write the word itself but must write the word that means the opposite. This must be done as quickly as possible as only five seconds will elapse between word and word. If they do not think of an opposite, instruct them to draw a dash and wait for the next word. It is well after the explanation is given to get

one or two of the duller pupils to explain just exactly what is to be done.

Read the number of the question and the word; *let five (5) seconds elapse*; and then read the next question number and word, and so forth. Tell the pupils not to get flurried if they miss one item but to wait for the next word.

#### OPPOSITES TEST

51. summer	60. often	68. sharp
52. slow	61. beginning	69. silent
53. masculine	62. rude	70. expenditure
54. command	63. ancient	71. grant
55. amateur	64. after	72. wild
56. soothing	65. above	73. huge
57. robust	66. come	74. empty
58. innocent	67. wrong	75. depressing
59. heat		

#### IV. SENTENCE UNDERSTANDING

This is the most difficult test to give as the answer is merely "yes" or "no." In order to insure that the pupils put their answers opposite the right number, the first procedure before explaining the test is to dictate the *last* word of each sentence from 76 to 100, the pupil writing the single word in the place provided. This last word serves in addition to the number, as a mark of identification for the question.

Now explain the general idea of the test with the following samples:

- Are examinations used in educational institutions?
- Is it beneficial to be educated?
- Is perfume a cheap commodity?

When the children understand that they have to answer each question by "yes" or "no," let them return to question 76—the question which has "dollar" written in it—and instruct them to write their answer to the questions one by one as you dictate them, taking care of the numbering. When the pupil does not know or is not sure, tell him to guess. He must write for each question "yes" or "no."

Give the number and the question *once and once only*. Allow five seconds and pass on to the next question. At the eighty-first, eighty-sixth, ninety-first, and ninety-sixth questions warn pupils to follow the numbering carefully.

## TEST IN UNDERSTANDING SENTENCES

76. Is a quarter more valuable than a fifth of a dollar?
77. Is a quotient obtained by subtracting?
78. Is secrecy essential to warfare?
79. Do criminals evade justice?
80. Are libraries an asset to a community?
81. Does sarcasm usually cause pain?
82. Is stamp-collecting detrimental to geographical knowledge?
83. Ought the community to eliminate education?
84. Ought charitable institutions to be efficiently managed?
85. Is innocence always established in courts of law?
86. Is tradition eliminated by the reading of historical books?
87. Does patriotism foster anarchy in the state?
88. Is exaggeration essential in scientific writing?
89. Is rapid transportation desirable in large cities?
90. Does exceptional mentality hinder promotion in school?
91. Is competition usually found in recreational activity?
92. Is appetite invariable at all times?
93. Is arithmetical calculation useless in everyday life?
94. Does constancy contribute to amicable understanding?
95. Is revolution a mark of stability in society?
96. Do illustrations usually clarify meaning?
97. Are commercial activities usually on a competitive basis?
98. Is tuberculosis a devastating disease?
99. Is punishment invariably just?
100. Is profiteering a legitimate form of business?

## SCORING

Tell the pupils to exchange papers. The examiner or teacher by reference to the key reads out the answer while the pupils score the questions, a tick ( $\checkmark$ ) for right and a heavy cross (**X**) for wrong.

It is well to correct items 1-75 and stop there, instructing the pupils to count the number right up to this point. Let this number be  $x$ .

Now correct items 76-100. Tell the pupils to count the number right and then the number wrong. The score for the last twenty-five items is obtained by subtracting the number wrong from the number right. This is done to eliminate the guessing factor. Where there are more wrong than right the score for 76-100 is counted as zero. Let the score from 76-100 be  $y$  then.

Final score  $= x + y$ .

For verification at the end of the test collect up information as follows:

Questions	Right	Wrong	Score
1-75	43	32	43 = $x$
76-100	20	5	15 = $y$

Total Score.....58 =  $x+y$

### KEY

INFORMATION	ARITHMETIC	OPPOSITES (Any reasonable opposite)
1. July	26. 384	51. summer
2. gasoline	27. 99	52. slow
3. Longfellow	28. 24	53. masculine
4. 8	29. 3	54. command
5. Lee	30. 30	55. amateur
6. Egypt	31. 4	56. soothing
7. deer	32. 2	57. robust
8. Ford	33. 60	58. innocent
9. Thermometer	34. 275	59. heat
10. 19	35. 24	60. often
11. 7	36. $10\frac{1}{2}$	61. beginning
12. 1924	37. 24	62. rude
13. oak	38. 4	63. ancient
14. November	39. 16	64. after
15. Sims	40. 3600	65. above
16. teeth	41. 8	66. come
17. Goliath	42. 6.01	67. wrong
18. shepherdess	43. 5	68. sharp
19. coffee	44. 4	69. silent
20. 98 ( $98\frac{1}{2}$ ) ( $98\frac{3}{4}$ )	45. 300	70. expenditure
21. gum (Spearmint)	46. 8	71. grant
22. CXII	47. 2	72. wild
23. Marconi	48. 5	73. huge
24. alien	49. 24	74. empty
25. Bachelor of Arts	50. 6.45	75. depressing

### SENTENCE UNDERSTANDING

76. dollar yes	85. law no	93. life no
77. subtracting no	86. books no	94. understanding yes
78. warfare yes	87. state no	95. society no
79. justice yes	88. writing no	96. meaning yes
80. community yes	89. cities yes	97. basis yes
81. pain yes	90. school no	98. disease yes
82. knowledge no	91. activity yes	99. just no
83. education no	92. times no	100. business no
84. managed yes		

## SECTION II

## VALIDITY OF TEST

After trying out the test on several hundred children and making all necessary modifications to bring it to its final form, the hundred questions were administered to two special groups to establish the validity of this method of examination. The first group was a grade VIIA, consisting of thirty pupils of an upper grade VII class, who had been selected from sixty pupils of grade VII by a combination of intelligence tests and teachers' ratings. The thirty pupils therefore formed a fairly homogeneous group, and put a somewhat severe test on an intelligence examination.

The group had previously been given the Otis and Haggerty intelligence tests. Taking the Otis and Haggerty as two typical accepted forms, a comparison of the correlation between these two tests gives a standard of reference as to the reliability of the ordinary form of examination with prepared blanks. Knowing this value and the value of the correlations between the present test and the Haggerty and between the present test and the Otis, an estimate can at once be obtained of the degree of equivalence of the present form of test. The following were the correlations obtained by the rank square difference method.

Seventh grade (upper section) 30 pupils

Correlation between Otis and Haggerty . . . . . 0.63

Correlation between Chapman and Otis . . . . . 0.68

Correlation between Chapman and Haggerty . . 0.61

The approximate equality of the three correlations shows that the present form of test is, for this group, certainly as reliable as the less reliable of the Haggerty and the Otis tests either of which, at present, may be accepted as a good average standard.

The second group of 41 pupils was taken at random from approximately 120 children of grade VIII. These 41 pupils when given the Otis and Chapman tests yielded a correlation coefficient of 0.78. Results of this order must necessarily be obtained unless there exists a much higher correlation between intelligence and efficiency as measured by speeded reaction to material read, than that which exists between intelligence and efficiency as measured by rapid oral questions.

The only other point of interest which will be taken up is the range of score for a typical group. As proof of sufficient range a typical grade VII, 108 cases, is distributed in percents.

Score.....	70	60	50	40	30	20	10	0
Percents.....	1	3	12	26	26	21	10	1

It will be seen that the range is even greater than that usually given by the Otis, Haggerty or the Chapman and Welles prepared tests.

The merits and demerits of this form of test may be summarized:

#### ADVANTAGES

1. There is no need for prepared blanks; only pencil and paper are required.
2. The test can be corrected by pupils exchanging papers.
3. Every element of the test is given to each pupil, whereas in the ordinary test the poor pupil only attempts a small fraction of the test.
4. There is a constant stimulation of the subject.
5. It tests an aspect of general intelligence upon which the school is particularly dependent, namely the power to comprehend and follow oral directions and instructions.

#### DISADVANTAGES

1. A slight lack of objectivity may result due to personal equation of examiner. (NOTE. Even in present prepared forms this factor enters.) In any case the lack of objectivity in the present test is much less than that found in the Binet examination by which the validity of the group test was initially established.
2. There is a possible superiority in the written form of test in so far as it admits of maximum speed for each pupil throughout the whole examination.

Although this test has only been employed for group work with grades VII and VIII and the first year of high school, there is no doubt that it can be used with benefit from grade VI to the third or fourth year of high school.

The author wishes to express his obligation to Mr. Ernest C. Witham and to Mr. W. H. Martin for facilities afforded him in doing this work

## SUGGESTIONS FOR PROCEDURE FOLLOWING A TESTING PROGRAM—I. RECLASSIFICATION

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Two types of procedure seem especially appropriate as a result of testing. One has to do with certain large regroupings of pupils so as to bring under similar influences those who have similar needs and opportunities. This I shall call classification or (emphasizing the idea of change) *reclassification*. It is an administrative measure; and, as here used, includes all regroupings of pupils except such as take place within the same class and grade.<sup>1</sup> It therefore includes regroupings which involve changes in any of the following ways: (a) in grade but not in class—e. g., in rural schools; (b) in class but not in grade—e. g., transfers from one section of the seventh grade to another; and (c) in both grade and class—e. g., promotion when the teacher changes. Such regroupings involve the promotion, demotion, and “leaving back” of pupils, their transfer from one section to another in the same grade, and their placement in any of the various kinds of special classes.

The other type of procedure has to do with certain minor regroupings of pupils (in the same grade and class) and with changes in teaching, the object being to subject each individual to specific influences according to his particular needs and opportunities. This type of procedure may be called *individualization*. It is not an administrative but a teaching measure. In the total process of differentiating instruction, reclassification makes the grosser adjustments and individualization the finer adjustments.

Although there is a widespread feeling that the measuring movement cannot be justified unless it leads to better school pro-

<sup>1</sup> I shall use the term “grade” to mean a level or stage of progress in the school. It is to be distinguished from the term “class.” The latter will be understood to mean the group of pupils responsible to one teacher. Thus in a given building or school system there may be several classes of the same grade. Moreover, more than one grade may be represented in a single class. Such is the case when pupils of the third and fourth grades are taught by the same teacher. Such is especially the case in the one-room rural school. As to the word “grade” it would be well if educational writers would never use it except to mean “a level of progress in school.” Its use as a synonym for *score*, *rating*, or *mark* often causes confusion.

cedure, it is remarkable how little the literature has contained beyond the expression of this feeling. Specific details of what procedures have been followed in actual practice have been exceedingly few. At the close of this article a short bibliography gives what seems to me to be the most helpful material of this nature.

Anyone who consults this material will be struck by its meagerness and by the small measure of success which has attended the efforts of the authors to think the problem through. There are several reasons why this is true—such as the remoteness of most of these writers from contact with pupils, the fact that teachers have not yet been heard from on this topic, the complexity of the data furnished by the tests, and the lack of a suitable method and medium of reporting. But I think the chief reason why neither the school people nor the research workers have given us much on what to do after testing is that test results are expressed in such a variety of ways as to make their interpretation difficult. Units have no important, common significance. Indeed they have almost as many different meanings and sizes as there are different tests. For instance, *one* in the Courtis Arithmetic Test in addition means an example consisting of 27 digits. In the Monroe Silent Reading Test *one* means a word read in a minute. In the Ayres Spelling Scale *one* means a word spelled correctly, while in the Thorndike Handwriting Scale *one* means a certain fraction of the range of ability in handwriting. The diversity involved in these sorts of units is unfortunate.

We may be able to reduce it. First, we may observe that it is not at all necessary that a thing be measured by something like itself. The strength of an electric current need not be expressed as a certain number of times a unit current. It may be measured by anything whose magnitude varies with it—e. g., by the deflection of a needle brought under its influence. Similarly, ability to read need not in theory be measured by rate or comprehension of reading. If quality of handwriting or accuracy in adding varied with ability to read, either could afford a measure of such ability.

Second, we may seek some aspect of school life which varies with all the different abilities which the tests measure. This seems a large task but with certain limitations on the term “varies



with" the quest becomes reasonable. Age, for example, is a factor in school life which, on the whole, varies with school abilities. Again, we consciously seek to register school progress by the grades in which we place children. A large mass of evidence shows that we are doing this very poorly. But despite the shortcomings of the graded system it remains a fact that in general children read better, spell better, and compute better in each successive higher grade. In this sense, therefore, grading varies with the school abilities of children.

Accordingly, I suggest that for all tests *one* be the step from one school grade to the next and that all test scores, no matter what may be their original units, be converted into grade units. This method by affording a common unit at once provides a universal basis of scoring.

Moreover, if, as is apparently the case, research workers and school men believe that *reclassification* of children is one of the most important procedures which may be based on testing, then this form of expressing scores has obvious value. We are not obliged to guess the meaning of a score of 21 on Test II of Monroe's Silent Reading Test nor the meaning of quality 60 on the Ayres Handwriting Scale. We say that the one is 7 and the other 8, meaning that the one corresponds to the beginning of grade seven and the other to the beginning of grade eight. Thus we may transmute these and other scores of different and often obscure meanings into scores having a common, an obvious, and a practical meaning.

To facilitate the conversion of point scores into grade scores Table I is furnished. In this table a few of the tests which have been carefully standardized are represented. The figures, except in a few cases, are not the standards printed in connection with these tests. They represent the best approximation from available standards to the scores corresponding to the *beginning* of each school grade. Sometimes the scores as published represent averages obtained from testing at various times throughout the year. They, therefore, approximate the results which one would expect at the middle of the year. By taking the mean of the published standards for two consecutive years, we may thus secure a standard corresponding to the beginning of the higher of these two years. This has been done in presenting these stand-

TABLE I. GRADE STANDARDS IN VARIOUS TESTS, ADJUSTED TO THE BEGINNING OF THE YEAR

Grade	ARITHMETIC				SILENT READING				Handwriting, Ayres		Spelling, Ayres (Col. P)	Composition, Willing		Language, Charters (Pronouns)	Geography, Hahn-Lackey (Col. P)
	Courtis Series B (Attempts)			Buckingham Problems	Monroe (Form 1)(a)		Courtis		Rate	Quality					
	Addn.	Subtr.	Mult.		Divn.	Rate	Comprehension	Rate				Comprehension (Index)			
VIII	11.2	12.2	10.9	10.1	8.2	104	24.5 } 21.0 } 20.8 }	191 } 168 } 145 }	..... } 95 } 93 }	77	60	96	77.8	4.4	73
VII	10.3	11.1	9.6	8.9	6.8	96	191 } 168 } 145 }	..... } 95 } 93 }	73	56	91	75.3	5.1	22.9	65
VI	9.2	9.8	8.7	7.1	6.3	94	168 } 145 } 9.3 }	..... } 95 } 78 }	67	52	83	71.1	6.3	20.0	54
V	8.0	8.2	6.7	5.3	5.3	79	145 } 9.3 }	..... } 78 }	59	48	72	63.4	8.8	16.8	42
IV	6.2	6.2	.....	.....	4.2	60	9.3 }	113 } 84 }	48	44	54	50.1	14.6	14.3	.....
III	.....	.....	.....	.....	3.2	.....	.....	.....	36	40	31	.....	.....	.....	.....

(a) The scores on Forms 2 and 3 of Monroe's Standardized Silent Reading Test may be reduced to the basis of Form 1 by multiplying them by the following constants:

	Test I		Test II	
	Rate	Comprehension	Rate	Comprehension
Form 2.....	0.88	0.95	0.80	0.93
Form 3.....	0.78	0.94	0.93	0.86

ards in Table I. Sometimes, however, authors have indicated that their standards refer to conditions at the end of the year. Under such circumstances the standard given for the end of the fourth year (for example) has been used as the standard for the beginning of the fifth year and has been entered in Table I opposite Grade V. The essential point is that all the figures purport to show the scores which typical children make or may be expected to make at the time they enter the indicated grades.

For purposes of reclassification, scores appropriate to the beginning of each grade are especially valuable—more valuable, for example, than scores applicable to the middle or end of a grade. When the question of changing the grade of a pupil is under consideration it is frequently decided on the basis of the pupil's supposed ability to *begin* the work of some other grade than the one to which he belongs. Even when "skipping" in the middle of the year or term is being considered, the scores corresponding to the beginning of the year will afford the best point of reference. Suppose, for example, that at the end of the third month of a nine-month school year a series of tests is given including the Curtis Silent Reading Test. One-third of the year having elapsed, we shall be interested in knowing not only the scores appropriate to the beginning of each grade but also those appropriate to each grade after one-third of its work has been done. The scores, when entered as in Table I with reference to the beginning of the year, will best serve the purpose. The beginning of the fourth grade is represented by 113 words per minute and the beginning of the fifth grade by 145. The difference is 32; and one-third of a year after the beginning of the fourth grade (the fourth and one-third grade, so to speak) would bring us to 124 as the best available expression of rate of reading for typical fourth-grade children at the time the test was given. The reader will readily see how much more direct such a procedure is than would be the case if 4 in Table I meant not just 4 but 4.5 or 4.9.

In using Table I interpolation will be necessary. Consider the case of a pupil who scores, on the Curtis Arithmetic test, 9 in addition, 8 in subtraction, 7 in multiplication, and 9 in division. In virtue of scoring 9 in addition he evidently shows ability between the abilities of typical children entering the fifth and sixth grades. Since the score for entering the fifth grade is 8.0 and that

for entering the sixth grade is 9.2, the grade interval is 1.2. This pupil's score is 1.0 above the entry for the fifth grade. He, therefore, shows an ability ten-twelfths greater than that which corresponds to the beginning of grade v. In other words, in grade units, his ability in addition may be represented by  $5\frac{10}{12}$  or by 5.8. In a similar way, his score of 8.0 in subtraction may be converted into 4.9 where the grade is used as a unit. His multiplication score of 7 is equivalent to 5.3 on the grade basis; and his division score of 9 is equivalent to 7.1.

Observe also that since we have converted the point scores into scores having the same units, the latter may be combined into an average score. We could not so combine 9 addition examples with 8 subtraction examples. Even more clearly we could not combine 9 addition examples with 6 errors in composition or 75 letters per minute in handwriting. But grade scores in as many tests as are provided with grade standards may be amalgamated into a general grade score. As I have just indicated, the pupil whom we have been considering had the following grade scores: addition 5.8, subtraction 4.9, multiplication 5.3, and division 7.1. His average grade for these four items was therefore 5.8. In general, he may be said to have performed nearly as well as typical pupils entering the sixth grade.

Some point scores are of such a nature that small abilities are shown by large numbers and large abilities by small numbers. In other words, the smaller the score the better the performance. This condition arises, for example, when the score expresses the time required to do a given amount of work or the number of errors made in doing it. Such a series of scores is given in Table I for errors of form in composition. Without some means for bringing expressions of this sort into line with those in which larger numbers indicate greater ability, we are in difficulties. The method of converting point scores into grade scores provides such a means. For example, a score of 8 formal errors in composition (within the meaning of the Willing scale) yields a grade score of 5.3.

In reducing point scores to scores in terms of grades we are not only securing a uniform basis but one in which the units are significant for the purpose we have in mind. While it is true that the increase in ability from one grade to the next is not the same throughout the elementary school, these increases are

equal in the vital sense that they are acquired in equal lengths of time. In order that a numerical expression may be reliable and useful, the units of which it is an aggregate need not be the same in every sense of the word. It is sufficient if they are the same in one sense only, provided that is the sense in which the measures are understood and used. For purposes of administrative procedure the grade as a unit is decidedly preferable both on theoretical and practical grounds to the various units in which point scores are expressed.

It is clear from what has been said that for reclassifying pupils educational (i. e., subject-matter) tests may be used to advantage. Intelligence tests, however, provide the most important type of information supplementary to that obtained through educational testing. Indeed, intelligence tests have been widely and usefully employed without reference to educational tests; and they have been used with particular reference to reclassification. Authors of them have avoided one of the mistakes of authors of educational tests. They have not used point scores (which have different meanings for different tests) but a common unit, namely, the mental age. With knowledge of the age appropriate to each grade, users of intelligence tests can also convert mental ages into grade scores.

At the conclusion of this article a few titles are given which will guide the reader to some of the best material on the use of intelligence tests for classification purposes. In at least one instance which has come to our attention<sup>2</sup>—and probably in others which have not—the children in an entire school were distributed according to their mental ages and according to their grades at the time of testing. This was done as a preliminary step in an effort to decrease the number of children whose mentalities were either above or below the level appropriate to their grades. The report indicates what can be done by organizing special groups of children, utilizing coaching teachers, and being generally watchful to bring children into their appropriate grades.

Despite the general belief in the efficacy of intelligence tests as a basis for classification, they seem to me to be insufficient for

<sup>2</sup> Pintner, Rudolf and Noble, Helen. "The Classification of School Children According to Mental Age," *Journal of Educational Research*, 2:713-28, November, 1920.

this purpose. No doubt a child whose mentality is six or six and a half can safely be placed in the first grade. No previous instruction is required. But whether a child whose mental age is seven and a half can at once begin the second grade, depends on what instruction he has received. He certainly cannot do so if he has had no instruction. In general it seems reasonable that when pupils evince a mentality corresponding to a higher grade than the one in which they are located, some evidence of preparation for the higher grade should be obtained before advancing them to it. *This evidence it is precisely the function of the educational tests to afford.*

An example will illustrate. Suppose a third-grade child has shown according to an intelligence test a mental age of ten years. This indicates so far forth that he should be doing fourth-grade work. If, however, tests in reading, arithmetic, language, etc., do not indicate a performance on a par with his mentality, we are justified in hesitating to classify him in the fourth grade. If, on the other hand, his performance in these subject-matter tests is at or above par, we are strengthened in our belief that he can do the work of the fourth grade. We have evidence not only that he possesses the required mental ability but also that he can put his mental ability to effective use.

Again, a mental test alone may indicate that a sixth-grade pupil has only fifth-grade ability. Nonintellective qualities, however, may be favorable in his case. Educational tests, if given, may show that he is actually meeting or surpassing the requirements of his grade. We have abundant evidence that such cases exist. It is clear that reliance upon intelligence tests alone—a reliance which would lead us either to demote or to leave back the pupil whom we have just described—would be unfortunate.

On the other hand, despite the attractiveness of the grading scheme presented in connection with Table I above, testing on subject matter affords only a partial guide in the reclassification of children. The fact that a fourth-grade child shows fifth-grade ability in arithmetic does not give us conclusive evidence that we ought to teach him arithmetic in the fifth grade. If we find that his mental ability is clearly better than is indicated by a mental age of eleven (the fifth-grade age), we may infer that with a little preliminary instruction he should be placed in the

sixth grade. This will be especially true if he has had no instruction hitherto in either fifth- or sixth-grade work.

On the contrary, even though a pupil's performance may equal that of the average fifth grade, a knowledge of his mentality may lead us to believe that he will not succeed in the fifth grade. He may be a child of fourteen with a mental age of eleven. His intelligence quotient or rate of development would then be but 79 percent of normal. If such a child were in the fourth grade, he would probably be unable to do satisfactory fifth-grade work in arithmetic despite the fact that his performance at the time of testing might equal that of the average fifth-grade child.

But the insufficiency of subject-matter testing is most apparent when we consider that it offers no evidence of whether pupils are performing as well as they should—no evidence of whether the school has been accepting poorer work than it would have been justified in demanding if a knowledge of the mentality of the pupils had been available.

Thus, neither educational testing alone nor intelligence testing alone is complete. As a basis of classification we desire to know both what children might do and what they have actually done. We recognize as factors in their success other personal qualities than intelligence; and we recognize that the work of the school as it influences them varies in amount and quality. These personal and institutional characteristics we can scarcely isolate, nor can we subject them to separate measurement in the case of each child. This, however, does not justify us in ignoring them. If we cannot measure each of them independently, we can at least measure their combined effect. This is exactly what we do by means of educational tests.

The result, however, as thus obtained is a record of the effect not only of the nonintellective (personal and institutional) factors but also of the factor of intelligence; and it is the effect of all these factors combined. But intelligence (which is essentially the ability to learn) is so important that we have rightly sought and obtained an independent measure of it. After obtaining it in the case of an individual child and after securing his performance on a series of educational tests, we know two things neither of which may be neglected. First, we have a measure of the one most important factor in his school success—

intelligence; and from this we are entitled to infer what might have been done, if other factors had been normally operative. Second, we have a measure of the pupil's school success itself. It may not be as great as his intelligence would have led us to expect, or it may surpass such expectations. In either case it tells us something about the operation, favorable or unfavorable, of all the other factors.

It is only when in some way these two sorts of data are combined that we may arrive at a defensible plan of action with reference to the pupil in question. We may do this on the assumption that the nonintellective factors are going to continue to operate as they have in the past; or we may plan our action on the assumption that certain of these factors will operate more favorably in the future. In particular, we may resolve that the institution will itself play a better part. A quickened sense of responsibility and of opportunity among teachers and pupils may manifest itself; and we may justifiably infer from the intelligence tests that the grade a pupil might have reached is also the grade which under improved conditions he may yet reach.

Clearly, what we need in this connection is a method of bringing intelligence and performance together. Since we recognize that, due to characteristics other than intellectual, a pupil's performance may be above or below that which his intelligence leads us to expect, we shall want some measure of the discrepancy. The educational quotient or achievement quotient has been offered as such a measure. This means that the measures of intelligence and of performance must be expressed in the same units. They may be expressed in years (ages), as is done in the battery of tests known as the Illinois Examination; or they may be expressed in school grades as is suggested above. In either case the extent to which performance exceeds or falls short of mentality may be at once found either as a difference or—with some added advantage—as a quotient. This difference or quotient is an expression of the extent to which, as elicited by the school, the factors which I have called nonintellective have exerted their influence. More accurately it measures the extent to which such factors have been above or below their normal potency. Such measures are highly important. Apart from their use in reclassification, they have decided value as indicating the extent to which



the school is making the most of its pupil-material. Obviously, however, these advantages cannot be secured unless both intelligence and educational tests are used.

In matters of reclassification, graded schools and ungraded schools<sup>3</sup> will proceed somewhat differently. Each type of organization has certain advantages and disadvantages. Each should make the most of its advantages.

In the graded school there is, or should be, opportunity for the organization of classes having specific aims and consisting of pupils of similar abilities. Superintendents, principals, and teachers should cooperate in organizing groups of children, whether under separate teachers or not, which have definite purposes. These purposes should be known to all—to pupils, teachers, and officials. Under these circumstances a great deal of work can be done. If a sixth-grade teacher has six pupils who according to mentality should be in the seventh grade and four who ought to be in the eighth grade, what she should do is to acquaint each of these groups of children with the object in view and give them extra work, added attention, and plenty of encouragement to make up the loss which the school has entailed for them through ignorance of their capacities. Educational tests will first indicate how great the loss is and will afterwards record the extent to which it has been recovered.

Teachers will not do this kind of work without an incentive. Naturally, they like to keep their bright pupils. A principal or superintendent would, in my judgment, do well to make much of every additional promotion of a child apparently qualified for a higher grade. Such an official would be justified in publishing such facts and in making them the subject of personal commendation. In what I have been saying I have been thinking more of bright than of dull children. There are indications that there are quite as many children whose mentality is above their present status as there are whose mentality is below it. Moreover, the school has paid less attention to bright than to dull children; and, as has often been pointed out, the instruction of bright children pays large dividends to society.

<sup>3</sup> By the term "ungraded schools" is meant particularly the one-room rural school. To a certain extent, however, it includes partially graded schools—i.e., those in which more than one yearly grade is taught by one teacher.

Before leaving this topic, I should like to say that in applying remedies, as the need for them is disclosed by testing, I am no advocate of precipitate action. If a fifth-grade child shows seventh-grade mentality, he should not, in my judgment, be placed in the seventh grade until intermediate work has been to some extent covered. All that I should urge is that the seventh grade should constitute a goal or objective toward which both the teacher and the pupil should work. Of course, as time passes this goal will recede; and by the time another year has elapsed it will no longer be the seventh but the eighth grade which should be attempted.

As to dull children—children who score low in both intelligence and educational tests—logic would suggest that we make the appropriate grade an objective as in the case of bright children. But here logic will not meet the need. It would require us to demote backward children as freely as we should promote gifted children. This we hesitate to do. Moreover, it is a question whether it is desirable from a social point of view. And we certainly cannot expect a pupil to work to secure a reduced grade. There is no motive and no hope of the pupil's cooperation, as there is when a higher grade is proposed. Perhaps we should simply fail to promote these children at the end of the promotion period. The best provision, however, for dull children—best for them and best for others—will consist in the organization of special classes.

The ungraded school is at a disadvantage in many ways; but in the case with which children may be reclassified, it is in a more advantageous position than the graded school. Suppose a child of the fourth grade is found to have a mental age of eleven years. Since eleven years corresponds to the fifth grade, this means, as has been indicated before, that if he had been properly taught from the beginning, he would now probably be in that grade. Results of subject-matter testing may corroborate the results of mental testing; or, in less favorable cases, the former may be lower than the latter. In either event, if the child is made acquainted with the fact that he can do the work of the fifth grade provided he gets ready for it, the presence of the fifth grade reciting in his hearing and to the same teacher creates a natural path along which his energies may be directed. Not only can he hear the fifth grade recite, but he can also participate with it as he could not if

he were in a graded school. From the very nature of the case there can be no conflict of fourth- and fifth-grade recitations. Both classes recite to the same teacher and hence of necessity at different periods of the day. If the teacher plans to have the child of whom we are speaking move forward into fifth-grade arithmetic, she can actually have him recite with both the fourth grade in which he now belongs and the fifth grade which is set up as a goal. Material in the course of study between these two grades can be taken up, so far as it is necessary to do so, with very little expenditure of time.

This last statement is not a glossing over of difficulties. To be sure it is logical to suppose that the child who abruptly moves into the fifth grade from the fourth will be handicapped by the loss of intervening subject-matter. But in reality the logic of the situation again fails to work. There is abundant evidence that the handicap through the supposed loss of this intervening material is not as great as we should expect. Even in arithmetic where we should first look for these "gaps" in a child's knowledge, they seem to be imperceptibly closed; and this appears to be true even when little attention is given to them. Not only is the published evidence on the question convincing but the experience of school people also supports it. Many a teacher who has "skipped" a child—sometimes with misgivings—has been obliged to concede that the child in question made good in every observable way.

Opinions differ as to the extent to which reclassification should take place. With reference to superior children the shades of belief are particularly numerous. They range from a sole reliance upon reclassification in the form of extra promotion to a sole reliance upon changing the course of study. I have been directing the reader's attention especially to reclassification.

It has also been my purpose to suggest a method of interpreting test results which will have obvious bearing on reclassification, and to point out the advantages in the same connection of a testing program which includes both intelligence and educational tests. Yet in a certain very real sense we do not reach the heart of the problem of using test results until we take up the question of the finer adjustments—the teaching processes—which I have covered by the term Individualization. I propose to devote a subsequent paper to procedure of this type.

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## WHAT SHOULD TEACHER-RATING SCHEMES SEEK TO MEASURE?

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For several years past there have been numerous attempts on the part of school administrators and supervisors to formulate a satisfactory scheme of rating teachers. Examination of the various plans as they appear, as well as experience in using some of them, convinces the writer that there is a fundamental weakness or deficiency in practically all schemes of this kind up to date. A careful consideration of some factors involved will help to make the issue clear.

A teacher-rating device in administration or supervision is a procedure for arriving at a judgment of the value of an individual instructor in the school industry. The real basis for judging this value is the output the individual can show as a result of his labor. This does not mean that the sole criterion of deciding on the retention, promotion, or demotion of a teacher is the progress objectively measured which her pupils make under her instruction within a given time. Such a criterion is only a partial one. All the teacher's work, including every major factor of it, should be considered; but these factors should be considered only with respect to what they contribute toward educational results in the children under her care.

Thus far, in formal rating schemes the composite resultant of teaching and the effort of the teacher have received either minor consideration or none at all. This is so anomalous a condition that the assertion may be doubted. That it exists, however, is proved by an examination of individual teacher-rating schemes. For instance, the score card devised and used by Ohio high-school inspectors, as reproduced in the May-June issue of *Educational Administration and Supervision*, does not include the mention of educational product or result. It is quite possible that the omission was intentional. The December issue of a current educational monthly which lies before us as we write contains the latest teacher-rating card we have seen. To "teaching power" it gives 25 percent; while "results" (being one of ten subdivisions judged of mutually equal value) is weighted 21½ percent! A recent

careful examination of a half-dozen or more teacher-rating schemes not only failed to find one where either "results" or "product" was given as much as 40 points out of a total hundred but also an entire lack of any central tendency to make the teaching product the basis of determining the value of the teacher.

There are three possible excuses for this condition. One is that these rating schemes, instead of attempting to formulate a basis for judging the value of a worker as such, have in reality tried to formulate a basis for judging the worker's possession of the characteristics necessary for success.

If this is the function of these devices, then let us frankly say so and limit their use largely to judging individuals before they are formally admitted to the profession. To judge whether a person possesses the qualities necessary for success in any profession or industry is vocational guidance. It is true that such guidance can well continue after the individual has entered the profession. But it is utterly fallacious to suppose that the determination of the existence of potential abilities, even if such a determination is scientifically made, is synonymous with measuring actual working efficiency. We must get away from the idea that because a teacher has a pleasing personality, good training, a cooperative spirit, and ability to write a good lesson plan, she will make a first-class instructor. We must get clearly the idea that no one is a first-class instructor whose training, work, and school associations cannot produce the results which society legitimately demands from the public school system. The fact is that there has been no discrimination made between score cards for rating student teachers and those for judging the merit of a worker in the profession. It is possible there should be none. If the latter be true the emphasis must be shifted. We must not continue to apply to skilled workers the gauge of potentiality. We should rather begin to apply to the apprentice the measure of productive ability.<sup>1</sup>

Another possible excuse is that one may not believe in the possibility of measuring the results of teaching. It is doubtless true

<sup>1</sup> Since the above was written, the writer has examined the score card published by L. B. Hill in the 1920 report of the Society of College Teachers of Education. This card is "for rating practice teachers and teachers in service." The item "skill in teaching process" is the only one listed that connotes results. It may receive a maximum weighting of 20 percent. But not all of its five subdivisions definitely measure the *school product*. There is a very definite emphasis on the *process of teaching* rather than on the *results of learning*.

that many who use the rating systems already formulated, and possibly some of those whose judgments entered into the determination of the Boyce Scale and similar ones, do not believe that the work or the product of the school can be measured objectively. To the degree that this condition obtains it is unsound procedure to include the judgment of these individuals in the formulation of a scale for rating teachers. On the other hand, if one does believe that objective measurement is possible and desirable for school work, then to accept any scheme for judging the individual worker which does not lay the larger emphasis upon the measurable product of that worker is to make our practice inconsistent with our theory.

A third possible excuse is concerned with the idea that the means for making quantitative and qualitative measures of the school product are at present too limited to provide an adequate basis for judgment. It must be admitted that such an idea contains an unquestionable element of truth. It is impossible at present to measure an educational worker's output as rigorously or as inclusively as that of an industrial worker. But a good beginning has been made. If we accept as the objectives of education, pupil achievement in acquiring useful knowledge, applied skills and proper ideals, the problem becomes clearer. We are already able to measure objectively the achievement of children in knowledge, and to a limited extent in skills; but we have no such measure of product in ideals. It is true that before any satisfactory or scientifically sound rating can be made, we must know what are the qualitatively and quantitatively measured products which the teacher secures. But it is also true that the absence or the limitation of these measures should not blind or confuse us as to the real issue involved in the problem of measuring the value of an educational worker. It should be obvious that schemes of teacher rating which give from 0 to 40 percent as the maximum weighting for the product secured by the worker are in this respect clear violations of sound principles in educational administration and supervision. Products or results should be given greater weight than any other single item. We believe that they should receive more weight than all the rest of the factors considered in judging the value of a teacher in service.

A good illustration of the type of a score card which we should strive for is the pupil's report card used at Public School 33, The



Bronx, and described in *Educational Administration and Supervision* for November, 1919. A child's ability in reading is divided between thought and expression, the first having a maximum of fifteen points and the second a maximum of ten. Grammar, word study, and arithmetic are each treated in a comparable manner.

A consideration of certain items in their bearing upon the problem of teacher rating as here discussed may help to clear up some troublesome questions. Suppose for example, that the single factor of morality is given a maximum weighting of fifteen out of a total of one hundred points. Suppose further that a teacher who receives seventy-five or more points may retain her position. It would be entirely possible theoretically for a teacher to receive but five points in morality and still be given a total of seventy-five or more. Yet what school administrator could justify his action in retaining a teacher who justly received only one-third of the possible points assigned to morality? The logical use of the rating plan would compel the retention of such an individual. Sound practice would expel her. Just why should she not be retained? For the simple reason that as a teacher with such limited moral assets, her school product—at least in ideals—would fall far below what it should be. The illustration taken is not unfair to present rating schemes. A careful examination of them will disclose a similar weakness in connection with the weighting of many other factors. The true significance of certain factors which are given small weight in most rating schemes only becomes apparent when regarded from the point of view of results. So regarded the absence of these factors or their presence in low degree is found to make the difference it should make and which in actual practice it does make.

Again, why do we wish a teacher to have a good personality? Simply because personality is a factor which functions toward the achievement of worthy results. Many teachers who possess mediocre personality are found after a period of service to merit a high rating on the basis of their ability to secure desirable school results—a higher rating even than those whose personality receives all the points possible to be accredited to it, but who are lacking in some other respects.

Consider the item of the teacher's effort. How much should it count in the final rating? Shouldn't one who exercises this

meritorius characteristic therefore receive points additional to those given a worker who shows less effort? There is apparent merit in this contention; for effort will tend to capitalize potential ability. A gifted person may not perform as well as one of mediocre endowment because of a difference in effort. On the other hand, absence of native endowment can never be atoned for by sheer effort. It is therefore fallacious to credit effort alone. The true measure is the product which individual ability plus effort is able to bring forth.

Another phase of the problem should also be kept in mind. The accurate measure of any worker's ability can be taken in terms of product only when the quality of the raw material is known. The work of two teachers of equal effort and equal ability may show entirely unequal products qualitatively and quantitatively. This may be due to differences in the intelligence, in previous training, in physical condition, or in home environment between the groups of children with whom they are working. Indeed, the same worker may accomplish less in measured product one year than another and at the same time expend even greater effort to secure the more meager results. But this consideration need be no real obstacle to the use of results as the sound basis for judging teaching merit. By means of intelligence tests we are able to measure the native ability, and by means of standardized tests the acquired ability, of a group of children. Thus we are able to arrive at some conclusion concerning the quality of the raw product which any teacher handles as a professional worker.

If present devices for determining a teacher's merit are unsatisfactory, what device is better? The following plan is submitted as a partial answer to this question. It is not proposed as final or complete, but rather as suggestive and illustrative of the principle for which we have argued in this discussion.

#### MEASURING A TEACHER'S MERIT AS A PROFESSIONAL WORKER

##### I. PUPIL ACHIEVEMENT—MINIMUM 50, MAXIMUM 75

###### 1. Objectively measured (for each subject)

- A. Knowledge
- B. Skills

2. Other Achievements
  - A. Habits of Study
  - B. Attitude toward
    - (1) Work
    - (2) School government
    - (3) School organizations
    - (4) Moral questions
    - (5) Life preparation
- II. MERIT IN MECHANICS OF WORKER—MINIMUM 20, MAXIMUM 40
  1. Organization and administration of
    - A. Tools
    - B. Raw materials
  2. Skill in Technical Method
- III. MERIT AS A SOCIAL WORKER—MINIMUM 20, MAXIMUM 40
  1. Cooperation with organization
  2. Professional habits
  3. Success in dealing with parents
  4. Sympathetic interpretation of pupils
  5. Discharge of obligations as community member

In the administration of any such a plan for rating the following would need to be taken for granted:

1. The knowledge of the potential ability of pupils to achieve, measured in terms of their intelligence.

2. A statement of pupil achievement at the beginning of any period over which the efficiency of a teacher's work is to be judged.

3. The working-out of intelligible standards in the items to be listed under "other achievements."

4. Specific statement by the supervisor or in the course of study, or both, of the tools and methods to be used and how to use them.

5. Statement of intelligible and reasonable standards under which several factors combine to make a teacher successful as far as she is a worker in a social institution.

# GRADE NORMS FOR THE NEW YORK CITY PENMANSHIP SCALE

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In February, 1915, the New York Board of Education adopted a uniform style of letters to be taught in all schools and authorized the teaching of the muscular-movement method of writing which had been tried out in a number of schools for several years.

The next step taken was the construction of a scale from the product of this system of penmanship. This was undertaken by Messrs. Lister and Myers, instructors in the Brooklyn Training School for Teachers. It was adopted by the Board of Education in February, 1918.

The setting up of grade norms for each element measured by the scale was undertaken by the Bureau of Reference, Research, and Statistics in June, 1919, and is the subject of this report.

## THE NEW YORK CITY PENMANSHIP SCALE

The New York City Penmanship Scale possesses certain characteristics which distinguish it from the scales that preceded it. In the first place it is a scale constructed from the product of the system of penmanship it is intended to measure. In the standardization of any educational product it is of fundamental importance to know "that the pupils have received the instruction in the field of knowledge covered by the scale or the test. Unless scales or the standards derived from standard tests are based on the results achieved by children after proper instruction, then standards established on the basis of the results from such tests are unsatisfactory as measures of instruction." (Ballou)

The second characteristic of the scale is the fact that it is analytic. In judging ability in penmanship there are so many things to be considered that a scale based only on general merit is of little assistance to the average teacher. The scale should help the teacher to look for the essentials in judging a given specimen of writing. Legibility, ease in writing or freedom of movement, good letter formation, uniformity of size, uniformity of slant, clear

and uniform spacing, neatness, and an easy, fluent appearance—all these make up the value of writing. The authors of this scale considered it possible and practicable to group most of these qualities under three headings.

Accordingly, as they say: "Under the caption *Form*, it was decided to consider accuracy in letter formation, with the standard letter forms adopted for the schools of New York City as the basis, uniformity of size, and regularity of correct slant."

"Under *Movement*, the specimens were judged as to quality of line. As is well known to students of penmanship, heavy, tremulous, and broken lines are evidence of either finger movement or muscular movement that is too slow and deliberate to produce skill; and clear-cut, smooth lines are evidence of the use of the easy-flowing muscular movement that is desired.

"Under *Spacing* the writing was judged as to correct and uniform spacing between letters, between parts of letters, and between words."<sup>1</sup>

As to the construction of the scale, the authors say in the same article: "The scale represents the average judgment of 21 teachers and penmen, experts in the muscular system of penmanship, and 4 psychologists. From 9 schools of Greater New York, representative of the best, medium, and poorest product of the muscular system of penmanship, 3,550 specimens were selected from at least one entire class of each grade from 3B to 8B inclusive."

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Figure 1 illustrates the resulting scale. The adjacent specimens are two steps apart.

### Figure 1. The Scale Illustrated

The scale consists of twenty-four specimens arranged in parallel columns—eight under *Form*, eight under *Movement*, and eight under *Spacing*. The scale values of the specimens under each element are 90, 80, 70 . . . 20. Four specimens under each element are reproduced below. These represent alternate steps beginning with 90.

<sup>1</sup> Lister, Clyde C., *The New York City penmanship scale* (Bulletin of the Brooklyn Training School for Teachers, no. 3, January, 1919, p. 4).

FIGURE 1. FORM

90 One must exercise in work and in play Active play and almost all kinds of work which children have to do, a good form of exercise. Long walks once or twice a week are good, but

This is good elementary school penmanship. Note the uniformity of size, slant, and alignment. The x is crossed carelessly.

70 One must exercise in work and play Active play and almost all kinds of work which children have to do, are good forms

Good form. The curvature between letters is slightly exaggerated. Note the approach to a, d, and m.

50 One must exercise in work  
and in play. Active play and  
almost all kinds of work  
which children have to do are  
good forms of exercise. Long

This writing slants too much. The t should not be looped. Note the careless tendency in completing k.

30 One must exercise in  
work and in play. Active  
play. And almost all kinds  
of work which children ha  
to do, are good. Forms of

This writing slants too much. The loops are too long and narrow. The t should not be looped. The a and d are poor.

90

One must exercise in work and in Active play and almost all kinds of work which children have to do a good form of exercise. Long walks or twice a week are good, but they are

The quality of line shown above is evidence of an easy muscular movement, which is produced by the muscles of the arm.

---

70

One must exercise in work and in Active play and almost all kinds of in which children have to do, are good of exercise. Long walks once or twice a week are good, but they are not quite so good as

This shows good movement and fairly good control throughout. Note the sharp, clear-cut quality of line.



One must exercise in work and play! Active play and almost all kinds of work which children have to do, are good forms of exercise. Long walks once or twice a

The smooth and uniform quality of line indicates fairly good movement. The n, r, s, and k are poorly formed.

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One must exercise in work and in play. Active play and almost all kinds of work which children have to do, are good forms of exercise.

Long walks once or twice a week

Although the movement is poor, this writing shows a better quality of line than the specimen below.

FIGURE 1. SPACING

90 One must exercise in work and play. Children have to do, and good forms of exercise. Long walks once or twice a week are good, - they are not quite so good as regular exercise.

This specimen shows a high degree of excellence in spacing. The writing, however, is too small.

70 One must exercise in work and in play. Active play and almost all kinds of work which children have to do are good forms of exercise. Long walks once or twice

This spacing is quite clear, but it is too variable. Compare One, kinds, and once.

50 One must exercise in work  
and in play. Active play and  
almost all kinds of work  
which children have to do  
are good forms of exercise.

*This spacing is clear, but variable both within and between the words. The slant is variable.*

30 Active play and all manner  
of kinds of work which  
children are good for and  
exercise. Long walks. Or  
twice a week or good, but it

*The separations between letters and between words are not clear. Some lines look like a long word.*

TABLE I. AVERAGE DEVIATIONS PER SPECIMEN FROM "EXPERT" SCORES FOR 86 PROSPECTIVE JUDGES—PRACTICE SAMPLES

Element	Average Deviations																Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		17
Form.....	1	.....	.....	4	8	16	12	25	14	2	1	1	.....	.....	1	.....	1	7.9
Movement.....	.....	.....	.....	.....	3	8	3	14	15	15	17	3	3	1	1	1	2	10.1
Spacing.....	.....	.....	1	2	11	24	20	18	1	5	2	2	.....	.....	.....	.....	.....	7.4
Total.....	1	.....	1	6	22	48	35	57	30	22	20	6	3	1	2	1	3	8.3

TABLE II. DEVIATION ACCORDING TO AMOUNT

DEVIATIONS	FORM		MOVEMENT		SPACING		TOTAL	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Zero deviations.....	300	26.9	171	15.2	216	18.0	687	20.0
5 points (½ step).....	288	25.9	374	33.2	543	45.3	1,205	35.1
10 points (1 step).....	290	26.0	239	21.2	215	18.0	744	21.6
15 points (1½ steps).....	124	11.1	136	12.1	162	13.5	422	12.3
20 points (2 steps).....	112	10.0	205	18.2	63	5.2	380	11.0
Total.....	1,114	99.9	1,125	99.9	1,199	100.0	3,438	100.0

The specimens were divided into four piles according to general merit, and 300 were then selected at random, about the same number being taken from each pile. The 25 judges arranged them in eight piles on the basis of equal intervals in merit. Each judge ranked the specimens three times—namely, as to form, movement, and spacing.

The next procedure is described as follows: "On the basis of the average rank assigned each specimen, the best and the poorest were selected as the top and the bottom of the scale. Therefrom the exact numerical rank which the other six samples should have was determined. The specimens whose average ranks are the same as these determined positions, or are nearest them were selected. Without exception all the samples on the scale are less than .1 from the *determined* position."<sup>2</sup>

#### MEASURING ACHIEVEMENT IN PENMANSHIP

*Conduct of tests.*—In the penmanship survey undertaken by the Bureau of Reference, Research and Statistics, particular care was taken to secure uniform conditions. The tests were given by thirty students from the New York Training School for Teachers who had taken a course in educational measurements and the normal course in muscular-movement penmanship. These girls were familiar with the various scales in penmanship and had had some experience in giving standardized tests. They also received special practice in giving this penmanship test, considerable attention being given to "timing."

The children memorized on the day before the test the sentence, "One must exercise in work and in play." The test consisted in writing this sentence repeatedly for two minutes. The class teachers took no part in the testing, although they were present at the time.

The test was given in fifteen schools involving five hundred classes and eighteen thousand children in grades IV to VIII.<sup>3</sup> The schools were chosen as representative of the whole system. About twelve thousand specimens were scored in full.

*Training the judges.*—The scoring of these twelve thousand samples of penmanship in each of the elements of form, movement,

<sup>2</sup> Lister, C. C. and Myers, G. C., "An analytic scale of handwriting," *Journal of Educational Psychology*, 9:417-31, October, 1918.

<sup>3</sup> In New York, A classes are low and B classes high divisions of the yearly grades.

spacing, and speed represented an enormous task. It was undertaken by Dr. Hamilton and Miss Scheuermann of the New York Training School for Teachers and by Mr. Lister of the Brooklyn Training School for Teachers. The services of training-school students were enlisted.

While a penmanship scale in the hands of trained scorers reduces variability in judgment, in the hands of untrained persons it gives no guarantee that judgments will be reliable. Nor does a knowledge of the theories underlying educational measurements or of the statistical derivation of scales insure accurate scoring. Likewise expertness in teaching penmanship while of some help does not imply reliability in scoring. To obtain accuracy in scoring there must be training in the use of the scale.

The training-school students who acted as judges had the following qualifications: (1) They had been instructed in the muscular-movement method. (2) They had taken the normal course in teaching that method. (3) They had taken the course in educational measurements at the training school.

It was arranged to give these students specific training for three weeks or longer through actual practice in judging specimens. For use in training the judges, standard specimens of writing were scored for form, movement, and spacing by one of the authors of the scale and by four of his associates. The specimens were coded so that the students were unaware of the "expert" score. In scoring these practice samples and subsequently in scoring the test papers the ascending-descending method was used.

It was planned to give the student judges an initial test in scoring and at the end of the practice period a final test. The data resulting from these tests would afford a measure of the reliability of each prospective judge and a basis for eliminating some of the students from participation in scoring the test papers. Unfortunately school conditions and other circumstances prevented us from carrying out our program in its entirety. We were, however, able to get an initial test for all the student judges and a final test for part of the group.

Table I shows for the initial test the distribution of the judges according to their average deviation per specimen from the expert scores. The table reads: In judging form one person deviated on the average 1 to 2 points from the expert scores, four

deviated 4 to 5 points, etc. From the last column it is evident that the greatest variation occurred in judging movement.

Details not shown in Table I indicate that scores above and below those of the experts were about equally frequent and of about the same range. Without regard to direction the amounts of the deviations at the time of the initial test were as given in Table II. Here as elsewhere a "point" is a unit of the scale. A step is the difference between successive samples on the printed scale and this difference is always ten points.

Under *Form* it will be seen that 878 or 78.8 percent of the judgments differed by one scale step or less from the standard or expert scores. In movement 69.6 percent of the judgments deviated one step or less, and in spacing 81.3 percent. In other words about three-quarters of the judgments either agreed with those of the experts or assigned values to form, movement, or spacing corresponding to the adjacent samples on the scale.

After the practice periods even this amount of unreliability was reduced. Complete data were secured for 56 of our 86 prospective judges. Their average deviation from the expert scores was reduced from 7.5 points, or three-quarters of a scale step, to 4.2 points, or less than half a scale step. Forty-two of them improved with practice, three remained stationary, and eleven lost ground—the last in each case but by a small amount.

Although the bulk of the papers were scored in each case by a single judge, an extensive study of the reliability of the ratings was made by having the papers of about 15 percent of the classes scored by three judges. A detailed analysis was made of the results for 20 classes, from which 753 specimens had been secured. It was found that on the average a judgment by one judge on an individual specimen varied less than four-tenths of a scale step from the median of three independent judgments. When individual results were combined in classes, it was found that the average error was less than three-tenths of a scale step. Since the object was not to secure results for individual pupils nor even for classes, but for larger grade groups of about 1,000 pupils in each case, it is believed that the trained judges rendered a reliable verdict for the intended purpose.

*General results.*—Table III shows the median scores obtained by each grade group throughout the city in each of the elements

measured by the scale, in form, movement, spacing and rate of writing.

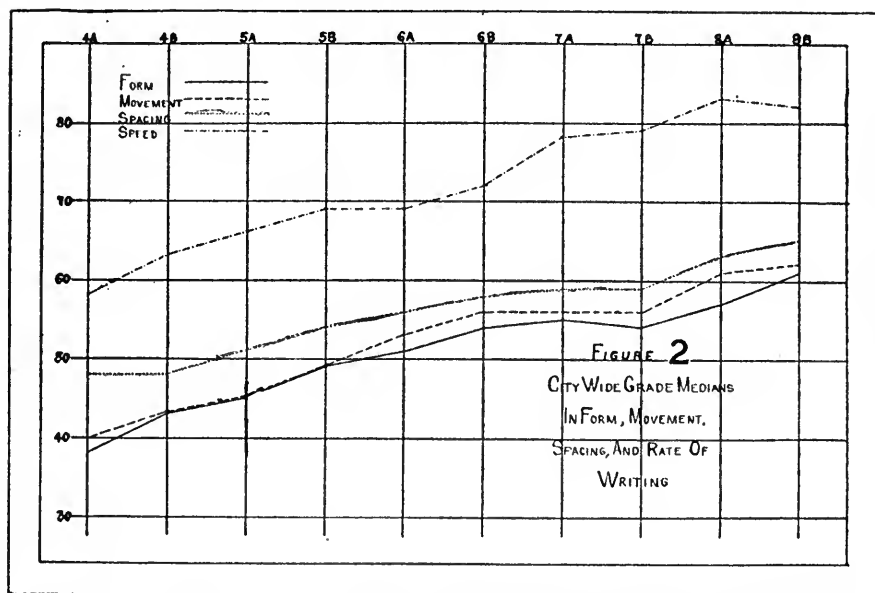
TABLE III. CITY-WIDE MEDIAN SCORES BY GRADES FOR FORM, MOVEMENT, SPACING, AND RATE

GRADES	FORM		MOVEMENT		SPACING		RATE		NUMBER OF PUPILS
	Median	S. D.	Median	S. D.	Median	S. D.	Median	S. D.	
VIII B	61	11.5	62	12.2	65	10.7	82	19.3	988
VIII A	57	13.1	61	14.1	63	12.4	83	18.4	1,117
VII B	54	12.2	56	12.7	59	11.1	79	19.2	1,225
VII A	55	12.3	56	12.9	59	11.6	78	17.4	1,327
VI B	54	11.9	56	12.7	58	11.3	72	20.3	1,481
VI A	51	12.4	53	13.1	56	11.7	69	18.1	1,414
VB	49	12.6	49	13.2	54	12.1	69	17.6	1,327
VA	45	11.5	45	12.2	51	11.9	66	17.8	1,529
IV B	43	10.7	43	11.5	48	11.2	63	15.6	1,110
IV A	38	11.1	40	11.7	48	11.0	58	13.6	241
City	51.3	12.0	52.9	12.5	56.4	11.5	72.5	18.5	11,759

Figure 2 shows the medians of Table III graphically. Both the scale values and the rate in letters per minute are shown on the vertical axis. The horizontal axis shows the grades. For the city as a whole the median score for all the pupils tested was (without regard to grade) 51.3 in form, 52.9 in movement, and 56.4 in spacing. This means that 50 percent of the pupils tested, without regard to grade, obtained these scores or better. The table also shows that 50 percent of all the pupils wrote at a rate of 72.5 or more letters per minute.

The product of the school may be best judged by the work done in the highest grade. Figures 3, 4, and 5 indicate approximately the results obtained in the upper eighth grade. If we arranged all the samples from this grade in order from the best performance to the poorest, and if we counted down one-quarter of the way from the best toward the poorest we should reach a sample like Sample A of Figure 3. The point thus reached is called the upper (third) quartile. Similarly Sample B of Figure 4 represents the median or the point reached by counting down half way; and Sample C of Figure 5 represents the so-called lower





(first) quartile or the point reached by counting down three-quarters of the way.<sup>4</sup>

Table IV gives for each grade<sup>5</sup> the median rate, the upper and lower quartiles and the range of the middle 50 percent. It also gives, for comparative purposes, the standards set up by Ayres and by Freeman and the results obtained in the Cleveland survey. Figure 6 shows the facts graphically.

TABLE IV. GRADE MEDIAN RATES, UPPER AND LOWER QUARTILES

Grades	IVB	VA	VB	VIA	VIB	VIIA	VIIIB	VIIIA	VIIIB
Q <sub>3</sub>	73.0	77.3	79.3	79.8	86.7	91.8	93.7	95.4	94.4
M	63.3	66.3	69.1	68.7	72.2	77.8	79.4	82.5	81.5
Q <sub>1</sub>	51.4	53.1	57.5	56.3	59.3	68.0	68.1	70.9	67.7
Range Middle 50 percent	21.6	24.2	21.8	23.5	27.4	23.8	25.6	24.5	26.7
Standards:									
Freeman	56	65		72		80		90	
Ayres	56	64		70		76		80	
Cleveland		60		70		76		80	


<sup>4</sup> The abbreviation for the lower or first quartile is Q<sub>1</sub>; for the upper or third quartile, Q<sub>3</sub>.

<sup>5</sup> The IVA data are omitted because of the few cases.



FIGURE 5. SAMPLE C, ILLUSTRATING THE TYPICAL PRODUCT OF THE POORER HALF OF THE UPPER EIGHTH GRADE

*One must exercise in work  
and in play. One must exercise in  
work and in play One must  
exercise in work and in play  
One must exercise in work  
and in play One must X*

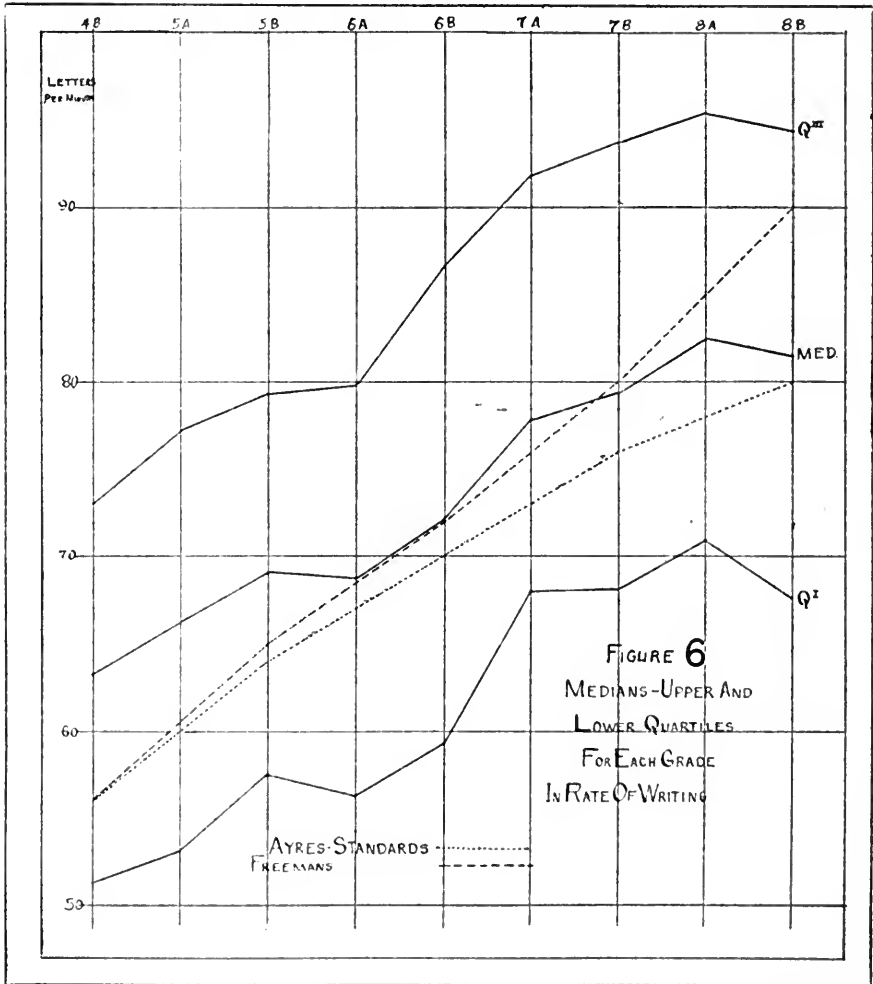
	 Form	Movement	Spacing	Speed
Sample C.....	55	50	55	64
Q1.....	53	53	53	68

This sample was equaled or surpassed by 75 percent of the pupils of the upper eighth grade.

It appears that the median rate of writing increases irregularly from grade to grade, rising from 63 letters per minute in the IVB grade to 82 in the second half of the eighth grade. There is no gain shown in the VIA grade over the VB, while in the VIIIB the rate is slightly lower than that of the grade below. The greatest gain appears in the VIIA.

New York children are by no means slow writers. Their rates are higher than the scores obtained in other surveys and exceed in all years the standards set up by Ayres. With the exception of the last three half years, the median scores are higher than the standards fixed by Freeman which represent the average of the better half of the cities tested by him.

There is an astonishing variation within grades in respect to rate of writing. Even when classes rather than pupils are considered and median scores rather than individual scores, the range is still conspicuous. The typical performance of one class of the lower fifth grade was 32 words per minute, of another 88 words per minute. In the upper sixth grade one class scored but 39 while another scored 98. Even in the upper eighth grade the class scores ranged from 48 to 96.



The condition is such as to indicate an absolute lack of grade standards. It probably shows that no particular attention has been paid to controlling the rate at which children write. Those who began as slow writers doubtless continued as slow writers throughout the grades, with only such increase as comes with maturity. The fast writers in the lower grades probably continue likewise to write at a rapid rate throughout.

While writing of a good quality is a prime requirement, instruction should also seek to improve the rate of writing, particularly

that of the slower writers. Less than 80 letters per minute is slow writing. The presence in the last year of the course of numbers of pupils who fail to attain a speed of 60 letters per minute indicates the failure of our instruction to give pupils about to leave school writing habits which will meet the requirements of the outside world. The presence of pupils in all grades who write at very rapid rates again indicates the need of control so that the quality of the writing of such pupils may not be sacrificed for the sake of speed. Rapid writing must be accompanied by satisfactory quality.

*Quality of writing.*—Since the New York scale records quality under three aspects—form, movement, and spacing—we shall devote a table to the most significant grade scores for each of these characteristics. Table V deals with *form*, Table VI with *movement*, and Table VII with *spacing*. Attention is called to certain facts which each of these tables exhibits:

1. The range from the median of the lower fourth grade to that of the upper eighth grade is small, amounting to about two steps on the scale or merely to the difference between adjacent samples in Figure 1.

2. The range of the middle 50 percent in each grade is almost as great as the range between the medians of the highest and lowest grades represented in the tables. In other words the difference between the performances of two fairly representative pupils of the same grade may be as great as the difference between the performances of two pupils one of whom is typical of the fourth grade and the other of the eighth.

3. Grades are scarcely distinguishable. This is shown not only by the small intervals between grade medians—intervals too small to be perceived on the scale—but also by the large degree of overlapping.

The extent of this overlapping may be roughly indicated by a comparison of the *upper* quartile of a grade with the medians of higher grades and by a similar comparison of the *lower* quartile of a grade with the medians of lower grades. These comparisons may be made directly from Tables V, VI, and VII. Table VIII shows for the element of *form* how the comparisons may be arranged.

In Table VIII the medians for the various grades are given across the top, the lower quartile is shown in the left-hand column, and the upper quartile in the last column on the right.

TABLE V. GRADE MEDIANS, UPPER AND LOWER QUANTILES IN FORM

Grade	IVA	IVB	VA	VB	VIA	VIB	VIIA	VIIIB	VIIIA	VIIIB
Q <sub>3</sub> .....	47.1	49.8	53.4	58.2	59.5	62.3	63.6	62.9	67.8	68.8
Median.....	37.9	43.2	45.4	49.2	50.5	53.7	54.5	54.0	57.0	60.8
Q <sub>1</sub> .....	30.0	35.8	38.3	40.9	42.4	45.2	45.6	45.4	47.7	52.6
Range of middle 50%.....	17.1	14.0	15.1	17.3	17.1	17.1	18.0	17.5	20.1	16.2
Intervals between medians	5.3	2.2	3.8	1.3	3.2	0.8	0.5	3.0	3.8	

TABLE VI. GRADE MEDIANS, UPPER AND LOWER QUANTILES IN MOVEMENT

Grade	IVA	IVB	VA	VB	VIA	VIB	VIIA	VIIIB	VIIIA	VIIIB
Q <sub>3</sub> .....	48.9	53.1	54.6	59.7	63.3	65.3	65.5	64.7	69.9	69.6
Median.....	39.9	43.3	44.8	49.3	52.9	56.1	56.0	55.7	60.8	62.0
Q <sub>1</sub> .....	33.3	35.7	36.4	39.8	43.1	46.3	45.9	46.4	49.2	52.9
Range of Middle 50%.....	15.6	17.4	18.2	19.9	20.2	19.0	19.6	18.3	20.7	16.7
Intervals between medians	+3.4	+1.5	+4.5	+3.6	+3.2	-0.1	-0.3	+5.1	+1.2	

TABLE VII. GRADE MEDIANS, UPPER AND LOWER QUANTILES FOR THE ELEMENT OF SPACING

Grade	IVA	IVB	VA	VB	VIA	VIB	VIIA	VIIIB	VIIIA	VIIIB
Q <sub>3</sub> .....	58.7	56.3	58.4	62.5	64.6	65.9	66.9	66.6	70.7	71.6
Median.....	47.7	47.7	50.5	54.0	56.2	57.7	58.7	58.7	63.2	64.8
Q <sub>1</sub> .....	40.3	40.6	42.2	45.0	48.2	50.8	51.0	51.6	54.3	57.5
Range of middle 50%.....	18.4	15.7	16.2	17.5	16.4	15.1	15.9	15.0	16.4	14.1
Intervals between medians	0.0	+2.8	+3.5	+2.2	+1.5	+1.0	0.0	+4.5	+1.6	

TABLE VIII. COMPARISON OF QUANTILES WITH MEDIANS TO SHOW OVERLAPPING

Lower Quartiles		MEDIANS										Upper Quartiles		
		IVA	IVB	VA	VB	VIA	VIB	VIIA	VIIIB	VIIIA	VIIIB			
		37.9	43.2	45.4	49.2	50.5	53.7	54.5	54.0	57.0	60.8			
IVA	30.0		3.9	2.3								47.1	IVA	
IVB	35.8	-2.1		4.4	0.6							49.8	IVB	
VA	38.3		-4.9		4.2	2.9						53.4	VA	
VB	40.9		-2.3	-3.6		7.7	4.5	3.7	4.2	1.2		58.2	VB	
VIA	42.4		-0.8	-3.0	-6.8		5.8	5.0	5.5	2.5	1.3	59.5	VIA	
VIB	45.2			-0.2	-4.0	-3.6		7.8	8.3	5.3	1.5	62.3	VIB	
VIIA	45.6				-3.6	-4.9	-8.1		9.6	6.6	2.8	63.6	VIIA	
VIIIB	45.4				-3.8	-5.1	-8.3	-9.1		5.9	2.1	62.9	VIIIB	
VIIIA	47.7				-1.5	-2.8	-6.0	-6.8	-6.3		7.0	67.8	VIIIA	
VIIIB	52.6						-1.1	-1.9	-1.4	-4.4		68.8	VIIIB	

The figures to the right of the series of blank compartments which run diagonally across the table show how much the upper quartile of a given grade exceeds the median of the grades above. The figures to the left show how much the lower quartile of a given grade falls below the median of lower grades. For instance, reading horizontally across from VB we note that the lower 25 percent of the VB group fails to reach the median of the IVB grade by 2.3 points and the median of the VA grade by 3.6 points. The figures on the same line to the right of the diagonal of blank compartments show that the upper quartile of the VB exceeds the VIA median by 7.7 points, the VIB median by 4.5 points, the VIIA median by 3.7 points, the VIIB median by 4.2 points, and the VIIIA median (five grades above) by 1.2 points.

*Relation of speed and quality.*—Hitherto we have considered speed and quality separately; we shall now consider the relation between them. It is possible to set up grade norms for the various elements of quality, norms which may be achieved only at the expense of speed. We may also establish certain norms for speed which may likewise be attained only at the expense of quality. Satisfactory quality must be attained, but it must be accompanied by satisfactory rates of writing.

From Table III which showed the medians in each characteristic of quality and also in rate, it may be noted that speed increased with one or two exceptions from grade to grade. At the same time the median scores in form, in movement, and in spacing also increased from grade to grade. There was thus a certain degree of correspondence as far as the whole grade groups were concerned, between the median speed and the median quality from grade to grade.

Does such relation hold within the grades? In order to determine this the average speed was determined for each scale score in each grade in form, movement, and spacing. Table IX shows for each grade the average speed at which each quality in form was written. This table reads: In the IVB grade 91 pupils scored 20 in form and their average rate of writing was 63 letters per minute, etc.

For each grade there was a general tendency toward decrease of speed as *form* improved. From data not here reproduced similar facts were discovered with reference to *movement* and *spacing*.





But although both rate and quality improved from grade to grade, we have no satisfactory answer to the general question of the relation between rate and quality of handwriting among school children. The correlation coefficient is the most exact expression of the relationship. Accordingly it was computed (by the product-moment formula) for each pair of characteristics. Instead of treating all the data involved in the scores of the 12,000 pupils, two sets of 1,000 specimens each were selected by a process of sampling. The results are shown in Table X.

TABLE X. COEFFICIENTS OF CORRELATIONS BETWEEN  
THE SEVERAL ELEMENTS

Elements	First Sampling		Second Sampling	
	<i>r</i>	P. E.	<i>r</i>	P. E.
Form and movement. . . . .	+ .75	.0093	+ .749	.009 <sup>2</sup>
Form and spacing. . . . .	+ .73	.0094	+ .738	.0097
Movement and spacing. . . .	+ .72	.0101	+ .716	.0103
Speed and form. . . . .	— .056	.02	— 0.54	.0 <sup>2</sup>
Speed and movement. . . . .	— .036	.02	— .029	.0 <sup>2</sup>
Speed and spacing. . . . .	— .013	.0213	— .016	.0213

The correlations between speed and the elements of form, movement, and spacing are negligible. The fact that the probable error is as large as or larger than *r* indicates the unreliability of our result. It appears then that there is little relation between speed and the different elements of quality in writing. The fast writers write a good hand as well as the slow writers. The good writers write rapidly as may also the poor writers.

In the case of the other elements a high degree of positive correlation is shown. This indicates that an increase in form would be accompanied by an increase respectively in movement and in spacing, and vice versa.

*Quality and speed in different schools.*—The results already presented have clearly indicated the variability of achievement in the various classes and grades. It has been shown that there is apparently an absolute lack of uniform standards. In this section data will be presented showing the relative emphasis placed upon speed and upon quality in some of the schools tested.

In order to show the development in penmanship through the grades, the progress in quality and the progress in speed were shown in one diagram. For quality the grade-median scores in form, movement, and spacing were averaged to obtain a single score. The resulting curves would not be materially different if we were to take only one element at a time.

Figure 7 shows the progress from grade to grade in three selected schools. The horizontal axis shows speed, and the vertical axis quality. In interpreting the diagrams we must bear in mind that the distance between the adjacent horizontals measures only ten points or one step on the penmanship scale, and that distance between the verticals represents but ten letters.

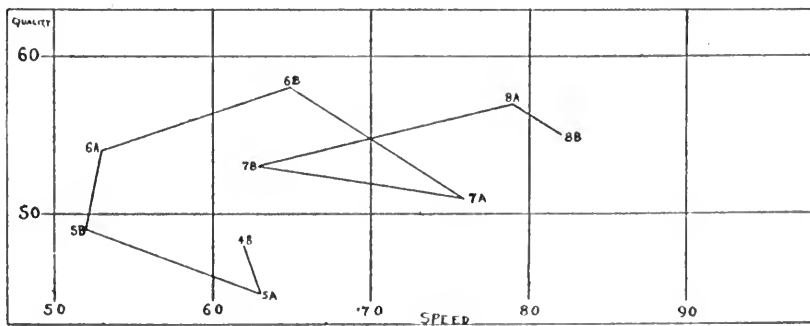
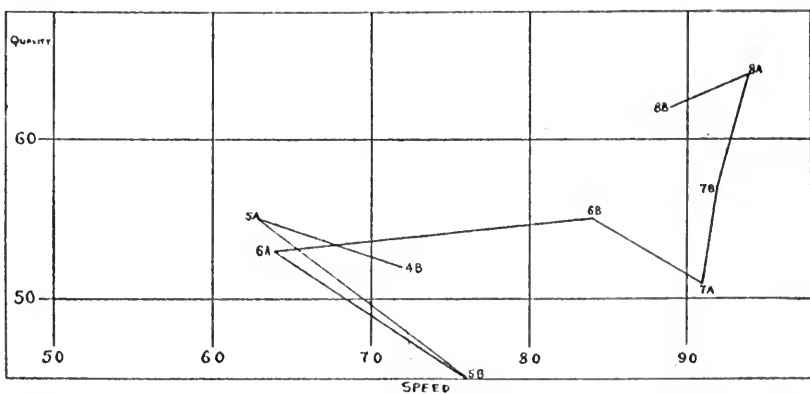
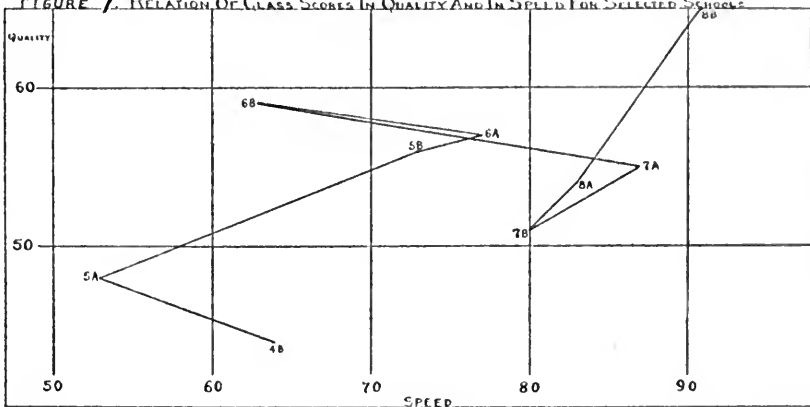
The reader would do well to trace the curious paths from IVB to VIII B as shown in Figure 7. For example at the school represented by the top section of the figure we start from IVB to VA by going backwards in speed, while making some (but not much) headway in quality. From VA to VB the lost ground in speed is more than recovered and there is a further gain in quality; VIA adds little in either quality or speed; VIB shows a loss in speed with very little gain in quality; etc. From such representations as these—and space alone limits our presentation of others—we get the impression of haphazard results. The condition is what might be expected in the absence of standards and of means of control.

#### TENTATIVE GRADE STANDARDS

The aim of penmanship in our elementary schools is to give the pupil a certain degree of writing skill. The course of study at New York prescribes that seventy-five minutes a week be devoted to penmanship in the IA to VIB grades, and that in that time the child be trained to write with legibility, ease, and speed. Such aims, however, are vague and indefinite and offer no material guidance to the teacher or principal in his work in penmanship.

Prior to the derivation of scales for objective measurement, our aims in penmanship, as in other subjects, were necessarily expressed in general statements rather than in definite terms. Now that we have such scales and means of measurement, we can formulate exactly the degree of writing skill that a pupil should attain as a result of the elementary course.

FIGURE 7. RELATION OF CLASS SCORES IN QUALITY AND IN SPEED FOR SELECTED SCHOOLS



The end product of our school training is represented by the VIII B pupil who is about to graduate. How well should a pupil in the VIII B write? At what speed? Immediately we answer such questions by asking other questions. How well need he write? How fast need he write? We find our answers in the demands of society upon the pupil and in the needs of his later life.

A number of investigations have been conducted to determine the degree of writing skill required by the outside world in various lines of endeavor. Such studies, however, were reported in terms of the Ayres scale so that the results could not be used in setting up norms for the New York scale. An independent attempt was made with the New York scale, to obtain under test conditions samples of handwriting of clerical employees in several large department stores. The group tested numbered 161, distributed as follows: 98 salesclerks, 17 billers, 39 checkers, and 7 clerks and bookkeepers. In all these positions legible, rapid writing was considered essential.

Table XI presents the median scores in each element for each of the above groups in comparison with the median scores of our VIII B pupils.

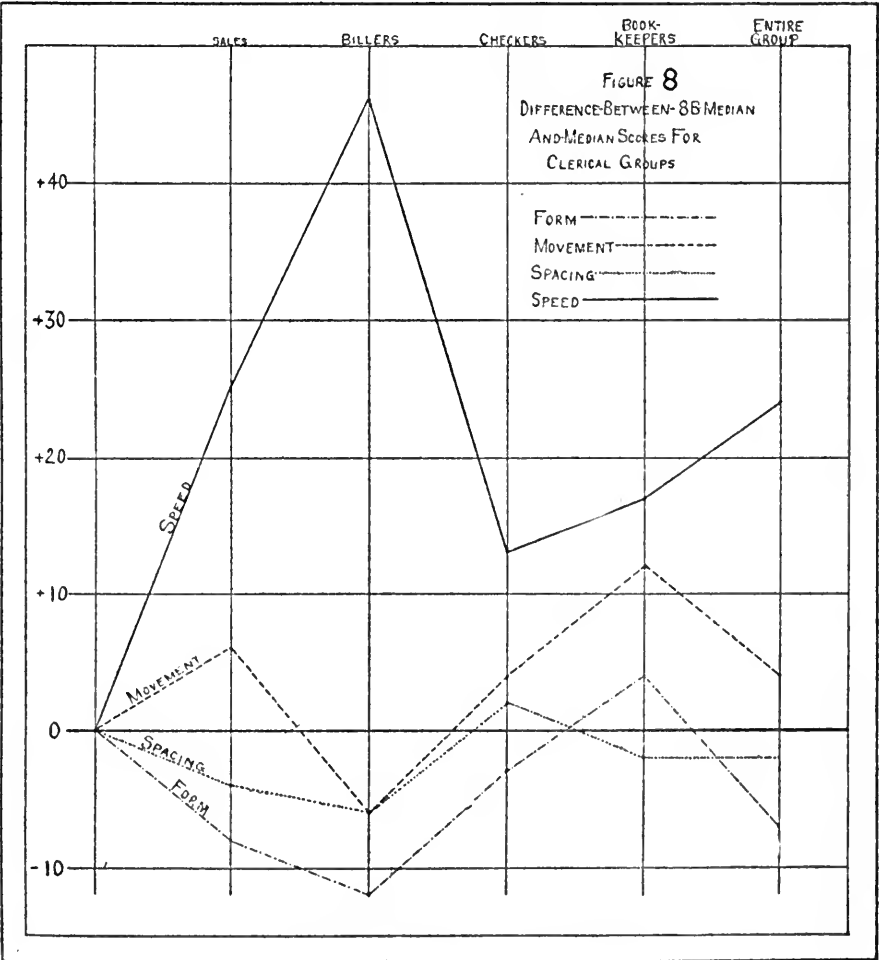
TABLE XI. MEDIAN SCORES OF GROUPS OF CLERICAL EMPLOYEES IN DEPARTMENT STORES

Group	Number	FORM		MOVEMENT		SPACING		SPEED	
		Me- dian	Differ- ence from VIII B	Me- dian	Differ- ence from VIII B	Me- dian	Differ- ence from VIII B	Me- dian	Differ- ence from VIII B
VIII B Pupils	988	61	.....	62	.....	65	.....	82	.....
Salesclerks.....	98	53	- 8	68	+ 6	61	-4	107	+25
Billers.....	17	49	-12	56	- 6	59	-6	128	+46
Checkers.....	39	58	- 3	66	+ 4	67	+2	95	+13
Bookkeepers....	7	65	+ 4	74	+12	63	-2	99	+17
Entire outside group.....	161	54	- 7	66	+ 4	63	-2	106	+24

The data in Table XI are presented in Figure 8 in terms of the amounts by which each employee group exceed or fall below the

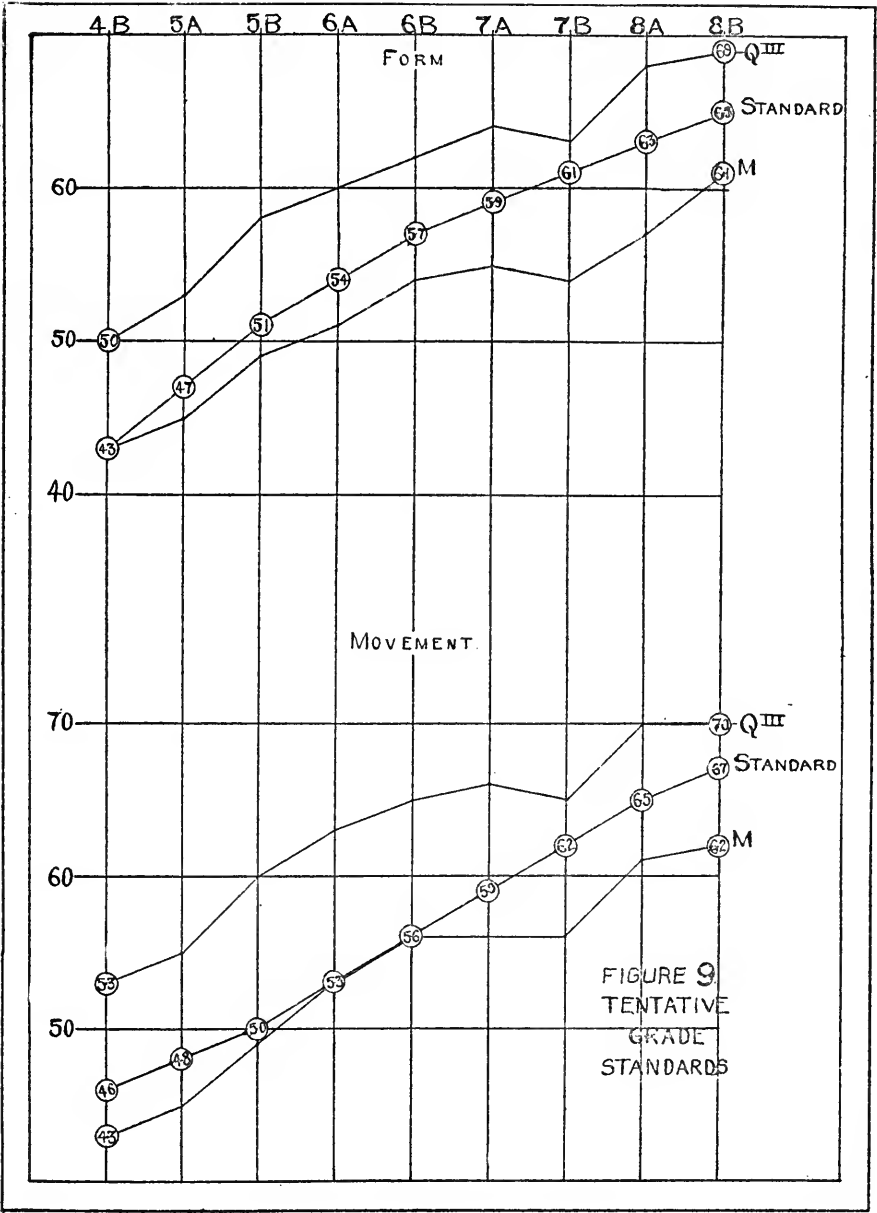
viiiB medians. It will be noted that in the three elements of quality the viiiB pupils did quite as well as the salespeople. In speed, however, the employee group greatly exceed the rate of the viiiB pupils, the salespeople writing at the rate of 107 letters per minute or 25 letters above the viiiB median, the billers 128 letters or 46 above, the checkers 95 or 13 above, and the bookkeepers 99 or 17 letters above the viiiB rate.

The data presented above while suggestive are not regarded as conclusive, and it is planned to continue the investigation. Meanwhile, Table XII presents the grade standards proposed for





each element. They are shown in Figures 9 and 10 in comparison with the upper quartiles and city-wide medians.



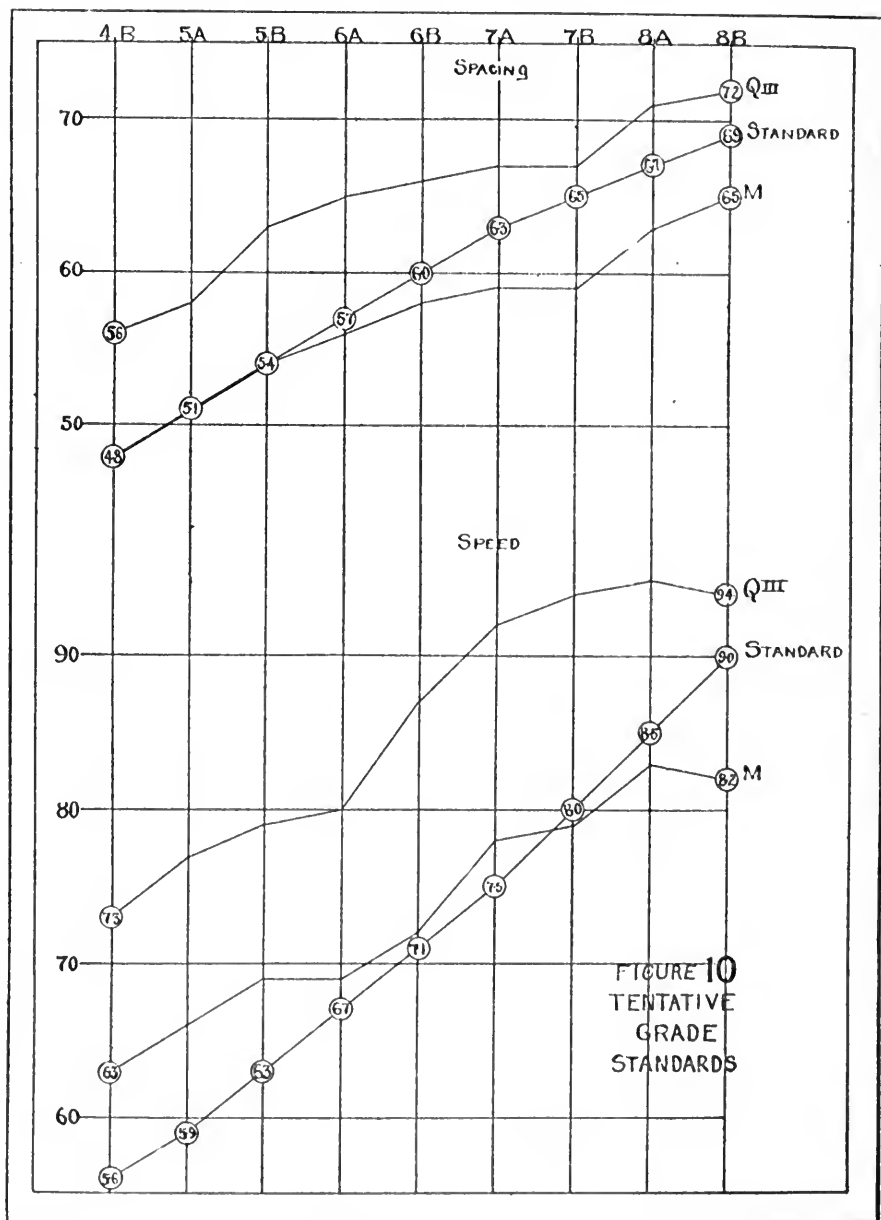




TABLE XII. TENTATIVE STANDARDS IN PENMANSHIP FOR THE NEW YORK PENMANSHIP SCALE

Grade	Form	Movement	Spacing	Speed
IVB	43	46	48	56
VA	47	48	51	59
VB	51	50	54	63
VIA	54	53	57	67
VIB	57	56	60	71
VIIA	59	59	63	75
VIIIB	61	62	65	80
VIIIA	63	65	67	85
VIIIB	65	67	69	90

For the VIIIB standard in form the average of the scores attained by the classes which exceeded the city-wide grade median was taken. This score of 65 is already reached by 35 percent of the VIIIB groups tested or by 10 of the 33 classes involved. The lower end of the curve was begun at 43, the city-wide median for the IVB. The curve of the grade standards was raised from the median curve, in some places arbitrarily, and in other places through smoothing to the points indicated. In the VIB, VIIA, and VIIIB, the grade medians were on a level, whereas the "Standard" curve maintains an even progress. The same procedure was followed in the elements of movement and spacing.

For speed the standards adopted are taken from those set up by Freeman. Figure 10 shows that in the lower grades such speed norms are below the grade medians.

The above standards are frankly tentative; but when the achievements of the better schools are considered they are not regarded as unreasonable nor difficult of accomplishment. The schools are working under a uniform time allotment and what is accomplished in some of the schools ought to be attainable elsewhere.

# A COMPARATIVE STUDY OF THE INTELLIGENCE OF WHITE AND COLORED CHILDREN

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Recent events in our national history have once more forced the question of the education of the American negro sharply into the foreground. Much has, of course, already been done by way of providing educational facilities for negro children. In the north there has been little or no attempt at differentiation. The white and the colored child have been freely admitted to equal educational opportunity. The south naturally has viewed its problem from a different angle, but even there state agencies have been awakened by patriotic, religious, and philanthropic forces to a new and productive interest in education for the colored race, until it may be said that at least the administrative aspects of the matter are in a fair way of being solved.

But the experience of unbiased educators has uniformly been that for some reason the negro child does not function in the American school as the white child does. All available statistics point to a higher school mortality, and to a markedly higher ratio of retardation. Various reasons have been given for this state of affairs. It has been asserted that the social status and traditions of the negro encourage meager intellectual standards, and that this is reflected in the school achievements of the negro child. By others it has been claimed that race differences of a fundamental type are involved, that the mentality of the negro child is essentially different from that of the white child, making identical standards both unfair and unwise. Of all the many explanations offered, these two have been most persistently and plausibly stated. It seems wise to attack the problem by a series of careful, unbiased investigations. Prejudiced opinion is rarely a good vehicle for truth.

This paper is an attempt to study the relative intelligence of white and colored children by the use of scientifically reliable

devices. It is perhaps only fair to say that the study was undertaken with a distinct bias in favor of the colored child. Three questions were raised: (1) what is the relative intelligence of the two races; (2) what is the relative intelligence of colored boys and girls; and (3) in what particular types of function, if any, is the difference between the two races most striking.

Among the first attempts to measure the mental endowment of the negro by an intelligence scale was that of Miss Alice C. Strong in 1913. The Binet test was given to 225 white and to 125 colored children of Columbia, South Carolina. Josiah Morse, in reporting the study, calls attention to the fact that while 29.4 percent of the colored children were found to be backward more than one year, only 10.2 percent of the white children were so retarded. He also points out that only 0.8 percent of the colored children were one or more years advanced, while 5.3 percent of the white children were thus advanced. Morse emphasizes the fact that the mental level of the colored children approximates that of a typical mill population. Discussing the question of special abilities, he calls attention to the fact that colored children excel in rote memory, naming words, making rhymes, and in time orientation, while they are clearly inferior to white children in aesthetic judgment, observation, reasoning, motor control, logical memory, use of words, resistance to suggestion, and in orientation to the complexities of civilized society. He finds also that according to the Binet scale, a somewhat larger number of white children are in a grade below than in a grade above the one corresponding to their mental ability, and that the reverse is true of colored children. Morse concludes his remarks on Miss Strong's study with the statement that "negro children from 6 to 12 and possibly to 15 years are mentally different from, and also younger than, southern white children of corresponding ages."

B. A. Phillips reports the results of a comparative study of negro and white children in the elementary schools of Philadelphia. Both mental and environmental factors were here taken into account, and it was found that whereas 42.1 percent of white children were retarded, 68.4 percent of the colored children were so handicapped. A general survey of the tests again shows that "colored pupils as a class were good in memory tests and poor in those requiring judgment."

Lacy, in a study of one hundred retarded pupils in the fourth grade at Evanston, Illinois, found that the differences in the distribution of the intelligence quotients of the colored and white children was very marked, and that the median intelligence quotient of the white children was at every age superior to that of the colored children. "On the whole the intelligence of the colored children is inferior to that of the white children."

A variety of tests other than the Binet scale has been employed in studying the relative intelligence of the two types of children. Thus, studies employing tests of cancellation, quickness of learning, substitution, completion, association, and memory are reported. The findings are all substantially as above reported. For fuller details the reader is referred to the bibliography appended to this paper.

The results herewith reported are derived from a careful study of 116 pupils drawn from the seventh and eighth grades of the junior high school of Lawrence, Kansas. The total colored enrollment in this school was 58, there being 24 boys and 34 girls. A chance selection of an equal number of white boys and girls was made from the enrollment cards. The names of the children so selected were, with one exception, wholly unknown to the examiners. These two groups of children were tested under uniformly favorable conditions by the use of the Stanford-Binet scale, arranged for use as a point scale. Each child was given a chance at every test, in order to assure perfect fairness, and to secure all the advantage of wide range testing.

The children were tested singly, the time required for each child varying from one to two hours, depending upon the promptness of the child's response to each test. The work was done during school hours in the school building during the first four months of 1919. It is of interest to note that on the whole the colored children appeared more at ease with the examiner than did the white children. Some of the white children seemed nervous and fearful lest they fail in the test. *The fear of failure seemed to be alien to the colored children's minds.* For the most part, they manifested an attitude of willingness to cooperate, and they seemed quite as interested and attentive as were the white children.

Considering the fact that at Lawrence the two races have identical school facilities throughout, and that environmental

conditions are perhaps as nearly equal as they are anywhere in the United States, the conclusions derived from this study should have at least a fair degree of reliability.

The distribution of chronological ages of the children selected for this study may readily be seen from Table I.

TABLE I. DISTRIBUTION OF CHRONOLOGICAL AGES

AGE	COLORED		WHITE	
	Girls	Boys	Girls	Boys
10.0-10.4.....	1	.....	.....	.....
10.5-10.9.....	.....	.....	.....	.....
11.0-11.4.....	.....	.....	.....	.....
11.5-11.9.....	.....	.....	4	3
12.0-12.4.....	2	1	5	1
12.5-12.9.....	5	.....	6	2
13.0-13.4.....	4	5	5	1
13.5-13.9.....	6	3	5	4
14.0-14.4.....	4	4	5	2
14.5-14.9.....	4	4	2	4
15.0-15.4.....	2	3	2	2
15.5-15.9.....	3	1	.....	2
16.0-16.4.....	2	2	.....	2
16.5-16.9.....	.....	1	.....	.....
17.0-17.4.....	.....	.....	.....	1
17.5-17.9.....	1	.....	.....	.....
Total.....	34	24	34	24
Median Age.....	13.92	14.38	13.20	14.25

A brief study of Table I reveals the fact that the distribution of the chronological ages of the white and colored children is fairly similar. The median age for the colored girls and boys is respectively 13.92 and 14.38, while that of the white girls and boys is respectively 13.20 and 14.25 years. The girls in each racial group are somewhat younger than the boys, though the difference between the median ages of the colored boys and girls is not as great as it is in the case of the white boys and girls. The median age of the colored group is 14.13, while that of the white group is 13.61.

The results of the mental tests as applied to these children are set forth in Table II, which shows the distribution of mental ages.

TABLE II. DISTRIBUTION OF MENTAL AGES

MENTAL AGE	COLORED		WHITE	
	Girls	Boys	Girls	Boys
9.0- 9.4.....	1	.....	.....	.....
9.5- 9.9.....	.....	1	.....	1
10.0-10.4.....	2	3	2	1
10.5-10.9.....	2	.....	.....	.....
11.0-11.4.....	4	2	1	1
11.5-11.9.....	6	3	.....	1
12.0-12.4.....	7	2	4	2
12.5-12.9.....	2	3	2	1
13.0-13.4.....	3	4	5	3
13.5-13.9.....	1	.....	4	5
14.0-14.4.....	5	3	5	4
14.5-14.9.....	1	2	3	2
15.0-15.4.....	.....	1	4	1
15.5-15.9.....	.....	.....	1	1
16.0-16.4.....	.....	.....	2	1
16.5-16.9.....	.....	.....	1	.....
Total.....	34	24	34	24
Median Age.....	12.14	12.67	13.88	13.70

The median mental age of colored girls according to this table is 12.14, that of white girls is 13.88. In like manner the median mental age of colored boys is 12.67 against 13.7 for white boys. The ratio between these median mental ages and the median chronological ages already presented in Table I can be tersely expressed in the form of median group intelligence quotients. For the colored girls, colored boys, white girls, and white boys these ratios are respectively, 0.872, 0.881, 1.052, and 0.961, from which it would appear clearly that there is an appreciable difference between the mental performance of the two racial groups.

The question can, however, be studied from another angle. Table III presents the distribution of the actual intelligence quotients derived from the test results. A study of this table should be useful, for it will bring to the surface in sharp relief the general tendencies which intelligence quotients seem to follow.

TABLE III. DISTRIBUTION OF INTELLIGENCE QUOTIENTS

INTELLIGENCE QUOTIENT	COLORED		WHITE	
	Girls	Boys	Girls	Boys
60- 64.....	1	.....	.....	2
65- 69.....	1	4	1	1
70- 74.....	3	.....	1	1
75- 79.....	4	1	1	1
80- 84.....	2	2	1	.....
85- 89.....	7	6	2	4
90- 94.....	7	7	2	1
95- 99.....	3	.....	3	2
100-104.....	3	1	5	4
105-109.....	1	2	5	3
110-114.....	1	.....	3	.....
115-119.....	.....	.....	2	.....
120-124.....	.....	1	3	4
125-129.....	.....	.....	4	1
130-134.....	.....	.....	.....	.....
135-139.....	1	.....	1	.....
Total.....	34	24	34	24
Median I. Q. ....	89.3	89.2	106.0	100.0

The intelligence quotient may be defined as the ratio of mental age to chronological age. Since it is being proposed and rather widely accepted as a reliable "measure of brightness," Table III takes on added significance, for it appears that while the actual median quotient of white girls is 106, that of colored girls is only 89.3; and that while the median quotient of white boys is 100, that of colored boys is 89.2. If the groups be studied as wholes, then the intelligence quotient of the white children as a whole is 103.3, and that of the colored children as a group 89.2. Of the white children 74 percent exceeded the median I.Q. of the colored children, while only 12 percent of the colored children exceeded the median I.Q. of the white children.

Following Terman's grouping of intelligence quotients, Table IV may be constructed. This table is still more significant when it is understood that while the colored group represented *all* the children of that race in the Junior High School, the chance-selected white group "happened" to include a number of the dullest and none of the most brilliant. Some of the white children who were not included in the investigation had earned intelligence quotients well above 140.

TABLE IV. GROUPING OF COLORED AND WHITE CHILDREN ON THE BASIS OF BRIGHTNESS

INTELLIGENCE QUOTIENT	DEGREE OF BRIGHTNESS	COLORED	WHITE
140 and above.....	Genius or near-genius.....	0	0
120-139.....	Very superior.....	2	13
110-119.....	Superior.....	1	5
90-109.....	Average.....	24	25
80-89.....	Dull.....	17	7
70-79.....	Borderline.....	8	4
Below 70.....	Defective.....	6	4

Of the colored children 53.4 percent fall below 90, the point designated by Terman as representing the lower limit of normal white intelligence. Of the white children only 26 percent fail to reach this level, which is quite compatible with a normal chance distribution. Of the white children 31 percent present superior intelligence or better, while only 5 percent of the colored children reach this level.

A careful analysis of the successes and failures in the individual tests of the Binet scale is illuminating, and may ultimately serve to throw some light on the problems raised in connection with the study of negro mentality. The facts are briefly as follows:

1. In all rote memory tests not involving reversing or other manipulation of reproduced material the two races were for the most part on an even footing, or in any case the difference was slight, and possibly due to chance factors.

2. In all memory tests that involved reversing or other manipulation of reproduced material the white children were markedly superior. The reason for this difference is difficult to see, unless there is involved an essential difference in function trends.

3. In all tests involving common sense adjustment to practical situations of a fairly familiar type the colored children were clearly the equal of the white children. In fact, in some of the tests the colored boys outdid the white boys by a good margin. For example, the problem of "the ball lost in the field" was solved in a superior way by 62.5 percent of the colored boys, and by only 41.66 percent of the white boys. The white girls, however, surpassed the colored girls 64.7 to 52.94.



4. In all tests involving adjustment to practical situations that were unique, or that involved the consideration of somewhat remote contingencies of no matter how simple a type, the white children of both sexes were definitely superior. The white children were superior in problems which Terman calls "Problems of the third degree," 100 to 94.82; in arranging five weights in order 86.2 to 67.24; in reconstructing dissected sentences 84.48 to 44.82.

5. All tests which involved abstract reasoning whether of analytic or synthetic type were passed more satisfactorily by the white children than by the colored children. Sometimes the margin was very wide, as in defining abstract words, 84.48 to 48.27, in discovering absurdities 91.38 to 69, and in noting differences between abstract terms, 41.38 to 12.

6. In all tests involving primarily verbal facility, the two races are practically on a par. There is a slight advantage on the side of the white children, but it is negligible.

7. In tests involving recognition of ideas, white children show a fairly clear advantage over the colored children. Terman's vocabulary test gives a mean of 38.48 words per colored child, and 48.04 per white child. If Terman's contention that the vocabulary test actually possesses diagnostic worth is ultimately established, then these performances take on a very definite meaning.

Table V presents in more concise form the specific findings in connection with the individual test groups above mentioned. From the values there stated, it becomes clear that each group tends to present characteristic capacity endowments, which may have a bearing on the economic, industrial, and social history of the two races.

It appears clear that in some types of mental function the colored group is quite the equal of the white group; but that in other functions, particularly in those which involve continuous and somewhat intense concentration of attention on subjectively developed and manipulated imagery the white group is clearly superior.

Incidental to the detailed study of the test results, it also appeared that while there was a clearly marked superiority of the white girls as compared with the white boys in nearly all the

TABLE V. THE RELATIVE EFFICIENCY OF COLORED AND WHITE CHILDREN IN MENTAL TESTS

Type of Tests	Average of Colored Passing	Average of White Passing	Ratio of Colored to White
Direct, non-manipulated reproduction (memory)....	74.94	74.39	1.007
Reversed or otherwise manipulated reproduction....	47.28	57.52	0.822
Familiar common sense adjustments (orientation)...	93.61	94.84	0.988
Adjustment to unfamiliar situations.....	36.2	58.18	0.622
Abstract reasoning.....	43.09	72.41	0.595
Verbal facility (common sense type).....	91.38	93.1	0.981
Vocabulary recognition.....	38.48	48.04	0.801

Total net efficiency of colored group as compared with white group, 83.1 percent.

tests of the series, there was no such clear superiority of the colored girls over the colored boys. Table VI, derived from the undistributed data, shows the situation clearly in terms of intelligence quotients.

TABLE VI. RELATIVE INTELLIGENCE OF COLORED BOYS AND GIRLS AND OF WHITE BOYS AND GIRLS

Group	Median I. Q.	Range	Variability
Colored boys.....	89.2	0.65 to 1.23	1.43
Colored girls.....	89.3	0.64 to 1.36	1.59
White boys.....	99	0.62 to 1.25	1.82
White girls.....	106	0.67 to 1.37	1.52

The physical and mental precociousness of the white girl undoubtedly accounts in part for the relation above revealed. The intelligence of the white boys in this group is 94 percent of that of the white girls. The intelligence of the colored boys is 100 percent of that of the colored girls. *One is tempted to ask whether perhaps the growth rhythm of the two races may not be essentially different*, and whether the well-recognized difference between the intellectual life of adolescent white boys and girls is also characteristic of colored adolescent children. The groups studied were too small to draw final conclusions, but a significant question is here raised.

The findings of this study coincide in all essential points with those published by others. There appears to be an unmistakable difference in the intellectual life of the two groups studied. The median intellectual endowment of the colored group is about 85 percent of that of the white group. This difference, however, does not extend over the whole range of mental performances, but is highly specialized. In some types of function, namely, those that involve direct unmanipulated recall, in common sense adjustments to simple situations, and in verbal facility the two groups are equal in ability. But in all functions that involve intensive concentration of attention on complex subjective activities of a rational type the white group has a distinctly greater ability. The difference lies essentially in the higher and more abstract types of psychic work. That the difference is fundamental is indicated by the very fact that the colored children approached the test cheerfully and without concern as to the outcome, while the white children were obviously concerned lest they "fail the test." One group functioned in terms of the obvious, the other in terms of the related possibilities.

This study labors under the disadvantage of serious limitations. The groups studied were small, and therefore subject to distortion. But most serious of all is the fact that the tests employed were only adequate for the study of intelligence and touched the large field of other psychic functions inferentially or not at all. Perhaps the colored group compensates in some particular for its shortcoming in intellectual function.

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## EDUCATIONAL MEASUREMENT IN THE FIELD OF HISTORY

CHAS. L. HARLAN

*State Normal School, Lewiston, Idaho*

Those who advocate the use of educational tests and scales must look upon the product, outcome, or attainment being tested as reduced to its lowest terms. Spelling attainment is tested by discovering whether the letters of a given set of words are in the correct order. Handwriting consists of letter forms of a given slant, spacing, heaviness of line, and alignment. Composition consists of words, sentences and paragraphs, spelled, capitalized, punctuated and arranged so as to express ideas more or less clearly, grammatically, and impressively. A similar situation prevails when one analyzes the other subjects for testing purposes. The tests and scales which have been most useful to the teacher and supervisor in diagnosing educational situations have been tests of specific attainment, those which indicate definitely the particular phases of a given subject in which a pupil is succeeding or failing. If the teacher, after testing her pupils in language, arithmetic, or spelling is not better informed concerning the specific weaknesses and strengths of her pupils, if she has not learned what particular phases of language, what processes of arithmetic, or what words in the spelling work need more attention in her teaching, the work of testing has not been greatly profitable.

To one seeking to devise standard tests in history, geography, literature and the other so-called "content" subjects, unusual difficulties are presented. The field of history with its many principles, facts, and details is almost unlimited in its extent. It is difficult to determine what the minimum essentials are. No teacher expects her pupils to assimilate and retain all the details of any history lesson. Yet there is little agreement as to what facts and principles a pupil should permanently acquire. There are some even who would claim that they do not teach history at all for the facts and principles which it contains but rather for the ideals and points of view which it may engender. Moreover, the content of history is being constantly and indefinitely increased by the addition of new material. It is difficult, for example, to foretell how much the accepted content of American history will be extended by the material dealing with the World War.

Another difficulty is apparent to the maker of standard tests in the field of history, namely, the failure of writers and teachers of history to define in commonly accepted and definite terms what the outcomes of the study of history should be. Information concerning the great men, the important movements, the dominant institutions of the past is interesting and inspiring; and this fact seems to one group of history teachers to justify the presence of history in the course of study. That the subject furnishes an excellent means for developing ideals of patriotism, heroism, courage, and honesty is sufficient justification to another group of history teachers. A third group argues that a pupil by viewing in perspective the growth and development of our institutions may thus secure a rational basis for his own actions as a citizen. These and other conflicting views as to why we teach history lead to indefiniteness and uncertainty as to the desirable outcomes of teaching, and consequently difficulty in determining the minimum essentials in this field.

Bagley and Rugg<sup>1</sup> have aided materially in defining the scope of the teaching of history. In most schools the textbook is the chief source of information in history. Certain names, places, events, dates, periods, movements, principles, and terms are presented in all the texts, while certain others occur with high degrees of frequency. These constitute a common basis in content which is at least presented to any reader of any of those commonly used texts. These common elements may therefore be considered as the minimum for testing purposes. Moreover, no matter what the aims of history teachers may be, one can be sure that this minimum of *information* has been given to the pupils.

Successful achievement in any subject implies at least the acquisition, by the pupil, of the essential knowledge in that subject. There may be many other outcomes from the study of history such as ideals, perspectives, points of view, and appreciations, but in the last analysis they are all dependent upon the essential facts and body of information presented to the pupil.<sup>2</sup> Therefore the incorporation of a part of this body of information is a prime requisite in the making of a standard history test.

<sup>1</sup> Bagley, W. C. and Rugg, H. O. *The content of American history as taught in the seventh and eighth grades.* (University of Illinois Bulletin, v. 13, no. 51, August 21, 1916.)

<sup>2</sup> Buckingham, B. R. "Proposed index of efficiency in teaching United States history," *Journal of Educational Research*, 1:161-71, March, 1920.

The multiplicity of aims in teaching history has led to a variety of methods of presentation. The earlier methods were designed to appeal to memory. Later ones furnish problems for thought and reasoning. Others seek to have the pupil organize and judge of the values of the information presented. Still others seek nothing more than to have pupils appreciate the heroism, the courage, and the sacrifices of the makers of history.

In order to meet this variety of methods and points of emphasis a history test should call for the exercises of a variety of mental functions and processes. Exercises which test memory alone are not sufficient. In addition to tests of memory there should be tests of association, organization, generalization, inference, judgment, comprehension of terms. This calls for variety in the types of exercises used in testing.

Another condition to be met with in making a satisfactory history test is that of eliminating, in so far as possible, elements of other subjects such as reading, composition, and spelling. A test of achievement in any of the "content" subjects should, as much as possible, be independent of attainments in the other subjects. A history test which requires much silent reading before the exercises can be worked out is a test of achievement not only in history but also in silent reading. Likewise, a test which requires long, involved or elaborate answers is, in part at least, dependent upon the pupil's composition ability. A pupil may be only a mediocre silent reader and a very poor writer of compositions; yet he may be rather proficient in his reactions to history study. Such a pupil, if tested by a scale which is exacting in its requirements as to reading and composition, will not be able to show his proficiency in history. The completion type of test seems to meet these conditions best.

Moreover, a history test should be so arranged and the directions and exercises should be so explicit that equivocal or ambiguous answers are not possible. No answer should call into exercise the judgment of the grader or scorer of the test. Such tests are also more easily and accurately graded with less expenditure of time and effort on the part of the teacher. It is even desirable that the exercises and scoring devices be such that pupils may score their own papers.

A consideration of the difficulties and possibilities of testing

in the field of history seems to indicate the following requirements of a good test:

1. It must cover a wide range of facts, those facts being ones which have been presented with emphasis. (Names, dates, places, periods, events, principles, terms, problems, causes, and results, etc.)

2. The test exercises must demand the use of a variety of mental functions and processes. (Memory, association, judgment, reasoning, organization, etc.)

3. It should in so far as possible be independent of attainment in other subjects; it should require little reading, composition, or spelling ability.

4. It should require unequivocal answers.

5. It should be easily given and easily scored.

One such test<sup>3</sup> which meets the above requirements has been devised and standardized by the writer. There are ten exercises each including from two to ten elements arranged in the order of their difficulty. The exercises vary in the types of responses called for and very little writing is required. A tabulation of the exercises follows:

- |               |                        |  |
|---------------|------------------------|--|
| Exercise I    | Men-Achievements.      | Five completion exercises.                       |
| Exercise II   | Terms-Examples.        | Ten exercises in understanding of terms.         |
| Exercise III  | Places-Events.         | Five places; to name historic events.            |
| Exercise IV   | Problems-Solution.     | Two situations; state type of action called for. |
| Exercise V    | Periods-Men.           | Five periods; associate men with period.         |
| Exercise VI   | Events-Years.          | Five events; state year of occurrence.           |
| Exercise VII  | Dates-Events.          | Five dates; give significant events.             |
| Exercise VIII | Principle-Proof.       | Four general statements; give example as proof.  |
| Example IX    | Movement-Significance. | Four movements; state importance of each.        |
| Example X     | Causes-Results.        | Five causes; state results.                      |

<sup>3</sup> Rugg, E. U. "Character and value of standard tests in history," *School Review*, 27:757-71, December, 1919.



Two points are given for each correct underlining, checking, or other form of answer and one point for partly correct answers. A key for scoring is also furnished. Thirty-five minutes is the time required to give the test, and pupils may score their own papers under the direction of the teacher.

The original test exercises were given to more than twelve hundred seventh- and eighth-grade pupils and to approximately six hundred high-school, normal-school, and university students. Returns were received from twenty-three schools in nine cities as follows: Detroit, Kansas City, Missouri, New York, Minneapolis, St. Paul, West Chester, Pennsylvania, Aberdeen, South Dakota, and Milbank, South Dakota. On the basis of the answers received the difficulty of each exercise was determined and tentative standards evolved. These standards need to be revised since they are based upon the percents of correct answers in the original one hundred exercises and not upon the fifty elements included in the test in its final form. They are, however, offered here as approximately correct. They represent median scores for classes at or near the end of the school year.

Grade VII	56
Grade VIII	86
Grades IX, X, and XI	72
High-school seniors	90
Normal-school students	96
University students	90

It will be noted that the median for the ninth, tenth, and eleventh grades combined is somewhat lower than that of the eighth grade. The medians are approximately the same for each of the first three high-school grades. No American history was taught in these high schools until the senior year. The seniors were completing their year or half year of study of American history. The normal-school students were also taking courses in American history. The university students had not studied American history since leaving the high school.

The writer does not contend that the test here described is a measure of all the results of instruction in history. Other information tests as well as "problem" tests and tests of appreciation should be devised and standardized and thus made available to teachers for measuring additional outcomes of their teaching of history.

## Editorials

### OUR CONTRIBUTORS

Our proximity to the grindstone during the past twelve months has been both prolonged and—touching, so to speak. As this number of the year goes to press we therefore find that we have been too preoccupied to realize our right to celebrate. Now, however, that our eyes are opened to the opportunity, our feelings are to say the least “mingled.” We should like, however, to detach from them a sentiment of gratitude to our contributors, because it is they alone who have made it possible for us to have what we are pleased to call our “policy,” or indeed to have a magazine at all.

Our contributors have been sympathetic. They have caught the idea; and they have sent us the sort of copy we wanted. Moreover, the material which they have submitted has steadily improved both in amount and quality. And it may confidently be expected to continue to do so. Articles in hand and promises received justify us in playing the rôle of prophet to this extent.

Indeed, in order to bring out additional valuable material, we found it advisable to enlarge our last two numbers to ninety-six pages. This was accomplished through the generosity of the publishers who, at a time when every square inch of paper had to be put to its best use, ignored the additional expense.

Our contributors have also been generous. They have overlooked a number of *gaucheries* on our part, doubtless—and we hope rightly—attributing them to growing pains. They have endured delays in handling manuscript—delays due, as they may have charitably supposed, to an editorial office not at first well organized for its work.

They have cooperated; they have magnificently acquiesced in our editorial supervision. We have tried to make it sympathetic, and they have been good enough to say we have succeeded. We have, however, been fussy. We have verified references, compared quotations with originals, reconciled text with tables, and checked up computations. We have accordingly made or

suggested to authors many alterations. In no case, however, has an author failed to accept a proposed alteration without giving a better reason for his version than we had given for ours. We have not yet encountered the author who believes that his self-respect is involved in maintaining his manuscript unaltered. (Perhaps there is only one thing to do with an article from such an author—namely, to reject it without reading it.) All the authors with whom we have come in contact have apparently looked upon the publication of their papers as joint enterprises in which both they and the editors were uniting to secure the best results.

We have therefore come down to the end of the year with an unbroken experience of pleasant relationships with our contributors. We cherish their sympathy; we appreciate their generosity; and we are grateful for their cooperation.

B. R. B.

#### THE NEXT STEP AFTER TESTING

Research workers have devised instruments for measuring attainment in school subjects; and teachers have used them by the million. They have administered tests, graded papers, and tabulated scores. In each school while this sort of work has been going on, hopes have been high. Sometimes, to be sure, it has not been the teachers who have hoped; but it is to be assumed that some one, or some group, has looked forward with faith to the time when conditions would be revealed.

Nor, as a matter of literal fact, have the tests in general failed to reveal the conditions. There is little disposition anywhere—as far as one may judge from printed reports—to gainsay the essential truth of the verdict which the tests may have pronounced. We are not blind to their shortcomings as measuring instruments, nor do we believe them to be possessed of the accuracy of either the yardstick or the spring balance. Yet we are confident that thoughtful school people do not expect such a degree of accuracy. Users of test material apparently believe that the results they have secured are essentially true.

But they expect something more—something, indeed, which no measuring instrument, as such, can be expected to afford. They ask, "What shall we do with these results after we have secured them?" This is distinctly another problem. It has

nothing to do with the tests as measuring devices—no more than the procedure of a physician has to do with his clinical thermometer.

We have heard it said that the test movement will fail unless it can improve instruction. The idea is good, but the expression is bad. So far as it is taken to mean that tests should improve instruction, it reveals a lot of muddy thinking. Tests were not devised to improve instruction but to measure its product. They should be judged by their validity and reliability as instruments for such a purpose. If by means of them we can make truer statements regarding educational outcomes than we can without them, if through their use we can adopt a common language and make our statements not only true but also indisputable, their usefulness is established. Whether they improve instruction then becomes a question of whether with more accurate knowledge at hand more effective teaching may be expected to take place.

Such a question answers itself. All the experience of the race is to the effect that the more we know about processes the better we can control them. If instruction has not been improved as the result of knowledge gained from testing, it is not the fault of the tests, for they have provided the facts and to provide facts is their sole office. It is not the fault of the test-makers who in virtue of being test-makers have rightly contented themselves with perfecting their instruments.

It is the fault of those whose business it is to utilize the knowledge. It is primarily the fault of the school people. It is true that research workers—not as test makers but as students of education—have not supplied either the light or the leading which might have been expected. But many of them have rightly felt that the best methods would have to be worked out in the day-by-day contact with class-room conditions. There is a certain almost insuperable difficulty in making from an office or professorial chair recommendations as to instructional procedure. Such recommendations when made from such sources are apt to betray their origin by their impracticability.

Under these circumstances it is the school people who must be heard from. The "next step" after testing is theirs. The question is not one of theory but of practice, and it can best be solved by those who are engaged in practice.

B. R. B.

## Reviews and Abstracts

E. H. CAMERON, *Editor*

PACKER, P. C., Anderson, H. W., and Brueckner, L. J. *Survey of public school building requirements in Cleveland Heights, Ohio.* Cleveland, Ohio: Board of Education, 1920. 39 pp.

School building surveys have pointed out very clearly that the school plants of many of our American cities are developed without any definite plan or program. Such surveys have indicated that boards of education have very infrequently thought of a development of their school plants over a period of years. In many instances, school buildings have been erected with present needs only in mind. School building sites have been purchased only as the need for the immediate location of a building arose, and mere judgment rather than scientific analysis of the entire problem has been only too frequently the basis for extensions to the construction program.

In many cities parents have brought pressure to bear for the erection of buildings within their districts, regardless of the future maintenance problem and irrespective of future developments. As long as school building costs were relatively low, such haphazard selection of school building sites and the construction of buildings of varying sizes were not clearly censured by the taxpayers. With the addition of various kinds of special room facilities to school buildings, the establishment of higher standards of construction, the rapid increase in the cost of construction as well as the increase in cost of maintenance, the public has, in an increasing degree, been demanding of boards of education the development of scientifically prepared programs for the school building plant.

A second impetus has been given such scientific analyses due to the participation of large private organizations in the development of similar programs for their own physical plants. Telephone companies, chain-store corporations, municipal water companies, and the like, have all found it necessary to make extensive investigations into population growth and population trends before expending large sums in the extension of their plants.

This report on the public school requirements of Cleveland Heights is one of the relatively few scientific analyses that have been made by the smaller cities in the United States in order to show what the school building problem will be over a period of years.

The authors have based their program upon population studies made for the extension of subways and other service systems. They have set up standards for sites, the distances to be travelled by children in the various types of schools and have suggested the building program for immediate adoption, as well as the possible program which the board must bear in mind over a period of the next twenty years.

The report shows the building needs for elementary schools, and for junior and senior high schools. It must be clear to the taxpayer who reads this report that all

partiality in the selection of sites has been eliminated and that equality of service for all sections of the community has been the underlying motive.

The Cleveland Heights study should be duplicated for all cities in the United States. The insistence by school superintendents on the development of such a program for their cities will free them from much political annoyance. The adoption of a building program assures freedom from strenuous building campaigns every time that a new school building is needed, and also assures the selection of sites which will enable school principals to develop a program of play in conjunction with the other school work. The unbusiness-like method of selecting school sites only as the need occurs has resulted in reducing our playground areas to a most unfortunate minimum in most of our cities. It also has resulted in excessive prices for sites because of increased property values.

As more frequent studies are made in this field, the technic of the work will be gradually advanced. The authors, in this instance, have made little contribution to the technic which has previously been developed, but on the other hand, have shown a very clear appreciation of their problem and have utilized the best elements that are to be found in previous school building studies.

N. L. ENGELHARDT

BETELLE, JAMES O. *A checking schedule for projected school buildings*. Milwaukee: Bruce Publishing Company, 1919. 32 pp.

The author has drawn the subject-matter for this pamphlet from a wide experience in the planning and construction of school buildings. He, like other architects, has been aware of the confusion and complexity of the problem which confronts the architect in his contacts with the educational authorities of school systems. Most architects have learned that school boards and school superintendents have not clearly outlined their school building problem before the architect is called into consultation. As a result, architects are required to formulate floor plans of school buildings with only a partial knowledge of what the school authorities desire or consider essential. Thus, architects are frequently required to make floor plans over and over again in order to include those rooms or accommodations, the need for which appears only through the review of floor plans. Mr. Betelle has endeavored to eliminate unnecessary duplication of floor plans by presenting a checking list which will enable school boards and school superintendents to determine at the very outset what types of facilities they desire to have included within the school building which is being planned.

An architect who utilizes part I of this pamphlet in his first contacts with the board of education and the superintendent of schools will succeed in establishing better relationships with the school authorities than would otherwise result. He will also save himself and his clients money, time, and unnecessary worry.

Part II consists of a checking list for the specifications which accompany the final working drawings made by an architect. Mr. Betelle has included here a list of definite items on which a superintendent of schools may check the specifications of the architect. The author has recognized that because of the bulk of data included within specifications, neither the responsible member of the school board nor the superintendent finds it possible to study the specifications with care.

The items of this checking list appear to be those of greatest importance and include many elements which may affect the educational program. This pamphlet will serve a very definite need. If used by superintendents of schools, it will enable them to secure better school buildings than they otherwise would get. In most of our communities, school buildings are only built at intervals of two, three or more years. The superintendent who is confronted with a school building problem needs the assistance of other devices which will enable him to secure for his community a school building which best meets its needs. Mr. Betelle has made a contribution in this field which is a splendid beginning. An extension of his idea to the point where specifications and working drawings may be completely checked by the superintendents of schools now becomes most desirable.

N. L. ENGELHARDT

ALEXANDER, CARTER. *School statistics and publicity*. (Beverley Educational Series.) New York: Silver, Burdett and Company, 1919. 332 pp.

The purpose of this book is to help "the superintendent of schools, active or in training, to arouse his public and to secure adequate support for his school." The help is to be given by presenting the simpler effective working tools of the research student in education, and of the educational publicist.

The contents of the book may be grouped conveniently under four main heads: (1) the need for better school statistics; (2) the collection of school data; (3) educational statistics; and (4) the effective presentation of school data to the public.

Dr. Alexander's style is popular and pleasing. The book is one that will appeal especially to the busy superintendent who must be tempted by sweets as well as meats in the reading that he does. The technical phases of educational statistics that are presented are reduced to the simplest terms and are made quite clear by illustrations drawn from the superintendent's problems. For superintendents in training the book would serve well as a basic text in an introductory course.

The outstanding contribution of the book is the discussion of the problem of effective presentation of school data to the public. Not only are the chapters dealing with this problem of interest and of value to the superintendent in training but they will appeal very strongly to the experienced superintendent whether he has had training in educational statistics or not. This part of the book consists of an excellent collection of graphs, pictures, illustrative phrases, etc., that have been used by the leading educational publicists in this country in surveys, books, and magazine articles. The hundred pages treating this problem form an excellent reference book on graphic presentation of school statistics. For these pages alone every superintendent should own a copy of the book.

The book is not well proportioned. The presentation of school statistics to the public is the core of the book and its excuse for appearance. Only one hundred out of three hundred thirty-two pages are devoted to this treatment. Too much of the book is given over to the problems of why we need better school statistics and how to collect data—one hundred pages in all. One hundred pages are given to an elementary treatment of educational statistics. This part of the book would have been more usable as a text if the author had given many more problems for the student to work out.

The reviewer used the book as a text during the past summer and found that the students enjoyed and readily grasped the discussions. The preceding criticisms are an outgrowth of this experience. With supplementation and expansion of the chapters

on educational statistics and on presentation of school statistics to the public the book makes a very usable text of college grade for an undergraduate introductory course.

A. G. CAPPS

ELSON, J. C. and TRILLING, BLANCHE M. *Social games and group dances*. Philadelphia: J. B. Lippincott Co., 1919.

The development of community recreation has created a need for concrete material, a need especially felt by leaders who have not had special training in play. Dr. J. C. Elson and Miss Blanche Trilling have made a splendid contribution to this field in their recent book *Social Games and Group Dances*.

The book is divided into three parts: (1) social mixers and acquaintance games, active tag games, parlor games and "stunts"; (2) group dances; (3) singing games and dances for children.

Games and dances are described which are suitable for children and adults, for small and large groups, and for various social occasions. The acquaintance games are especially well selected both as to variety and originality. They are very "playable." The "stunts" are clever and well adapted for small groups. The descriptions of the dances are accompanied by the music and illustrations of the different figures, and can be easily learned.

Undoubtedly the best recommendation that can be given is the fact that these different forms of recreation presented have been successfully "tried out" by the authors who have had wide experience in the teaching of recreation. Any leader in recreational work may do well to have this book as a guide. It furnished material for the kind of recreation which is most valuable from the standpoint of wholesomeness and real fun.

LOUISE FREER

## News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Walter S. Monroe, University of Illinois, Urbana, Illinois.

About two hundred teachers and superintendents attended the first meeting of the South Dakota Educational Research Association which was held at Aberdeen, South Dakota, June 22-23, 1920. The membership in this association is announced as follows:

City Superintendents.....	20
City Teachers.....	75
Rural Teachers.....	150
County Superintendents.....	5

This membership is interesting because of the relatively large number of rural teachers.



A committee appointed by the Department of Rural Education of the National Educational Association is organizing a study of the following questions: "In which of the two outstanding types of rural schools, the consolidated and the one-teacher, are the results of instruction superior?" The study is to be made by giving the following educational tests: Monroe's Standardized Silent Reading Test, Woody-McCall Fundamentals in Arithmetic, Trabue Language Scales B or C, Iowa Spelling Scale, and Ayres Handwriting Scale.

A state director has been appointed by each state to cooperate with the committee in this work. Any county superintendent who is interested should communicate with the chairman of the committee, J. M. Foote, State Department of Education, Baton Rouge, Louisiana.

Director R. L. Morton of the Extension Department of Ohio University, Athens, Ohio, is initiating a testing program in southeastern Ohio. The tests are to be given on the following dates: first testing, Tuesday, October 12 to Friday, October 15, inclusive; second testing, Tuesday, January 18 to Friday, January 21, inclusive; third testing, Tuesday, May 3 to Friday, May 6, inclusive.

The tests recommended for use are Courtis Standard Research Tests in Arithmetic, Series B, Monroe's Timed Sentence Spelling Test, Monroe's Standardized Silent Reading Tests, and Ayres' Handwriting Scale.

Director Morton has issued detailed directions covering the ordering of the test material and the use of it in the schools. In addition he places at the disposal of the superintendents and teachers his department. Where possible he plans to visit the schools where assistance is desired and demonstrate the uses of tests in classes of children.

The first annual conference of the superintendents of city schools of Illinois was held at the University of Illinois, November 17 and 18, 1920. This conference was organized under the supervision of the Bureau of Educational Research of the College of Education.

The library division of the Bureau of Educational Research exhibited bulletins, recent educational and intelligence tests, textbooks, and magazines. This exhibit was maintained not only for the benefit of the Superintendents' Conference but also for the High School Conference held during the same week.

As the following program indicates, the conference was largely devoted to the consideration of educational research.

Wednesday, November 17, 9:30 A. M.

*Professor B. R. Buckingham* of the  
University of Illinois, Presiding

Music.....Urbana Public Schools

Address of Welcome.....President David Kinley

Address: "Scientific Methods of Improving Reading".....Professor C. H. Judd

*Director of School of Education, University of Chicago*

Address: "Individualization of Instruction".....Professor E. H. Cameron

*Professor of Education, University of Illinois*

Address: "A Recent City-wide Project in the Schools of Decatur". Mr. J. O. Engleman  
*Superintendent of Schools, Decatur*  
 Luncheon 12:15 at Trinity M. E. Church

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Wednesday, November 17, 2:00 P.M.

*Superintendent T. W. Callahan of*  
 Galesburg, Presiding

Address: "A Fair Deal for City Schools under Unit Control".....Mr. G. P. Randle  
*Superintendent of Schools, Danville*

Round Table: "Scientific Methods of Improving Reading".....  
 .....Led by Professor C. H. Judd

Address: "Physical Education Legislation".....Mr. E. D. Caulkins  
*Manager, National Physical Education Service, Washington, D. C.*

Get-Together-Dinner, 6:15 P. M. at Trinity M. E. Church

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Wednesday, November 17, 8:00 P. M.

*Superintendent D. Walter Potts of*  
 East St. Louis, Presiding

Music.....School of Music, University of Illinois

Address: "Cooperative Research".....Professor B. R. Buckingham  
*Director of Bureau of Educational Research, University of Illinois*

Address: "Projects Being Carried on by the Bureau in Chicago".....Mr. P. R. Stevenson  
*Bureau of Educational Research, University of Illinois*

Address: "Reorganization of the Upper Grades of the Elementary School".....  
 .....Professor C. H. Judd..

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Thursday, November 18, 9:30 A. M.

*Superintendent E. E. Lewis of*  
 Rockford, Presiding

Music.....Urbana Public Schools

Address: "Intelligence and School Progress".....Professor M. E. Haggerty  
*Dean of School of Education, University of Minnesota*

Address: "Individual Versus Group Standardization".....Professor Walter S. Monroe  
*Assistant Director, Bureau of Educational Research, University of Illinois*

Round Table: "Intelligence and School Progress". Led by Professor M. E. Haggerty  
 Luncheon and Business Meeting, 12:15 P. M. at  
 Trinity M. E. Church

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Thursday, November 18, 2:15 P. M.

*Superintendent E. C. Fisher of*  
 Rock Island, Presiding

Address: "The Essential Criteria of a Satisfactory Test"... Professor M. E. Haggerty

Address: "The Use of Educational Tests as a Basis of Promotions, Groupings and  
 Stimulus to Pupils and Parents.".....Mr. I. M. Allen

*Superintendent of Schools, Springfield*

Address: "Measurement as an Aid in Supervision".....Dean C. E. Chadsey  
*College of Education, University of Illinois*

The following communication dated October 1, 1920, has been received from J. Carleton Bell, Secretary-Treasurer of the New York Society for the Experimental Study of Education. Because this announcement is of general interest it is printed herewith.

**Society for the  
Experimental  
Study of Edu-  
cation**

"Are you interested in improving the efficiency of teaching? Do you want to know what mental equipment your pupils bring with them to your classes? Could you not help them more if you knew their capacity for learning in various fields?

"The New York Society for the Experimental Study of Education is an organization designed to afford a clearing house of ideas for those who are interested in such questions. It meets at the Washington Irving High School on the second Friday evening of each month from October to May. The annual dues are \$2.00. For the current school year special emphasis will be laid on the problems of the high school. In spite of the obvious need for the most careful, scientific studies of the mental capacities of high school pupils, their learning processes, and their methods of attack upon the subject matter of their courses, little experimental work has been done in this field. It is hoped that the high school teachers of New York City will appreciate the importance of such studies, and that each one will desire to take part in some investigation. Your attention is called to the problems suggested in the enclosed Bulletin.

"Do you not think that this movement is worthy of your support? Even though you may not be able to attend the meetings of the Society and participate actively in its work, do you not want to identify yourself with it, receive its Bulletins, and help in the furtherance of its aims?

"May I not present your name for membership at the next meeting? Please let me hear from you in regard to this matter."

Dr. Henmon's article "Improvement in School Subjects Throughout the School Year" in the February number of the *Journal of Educational Research*, deals with

**Improvement in  
School Subjects  
Throughout the  
School Year**

facts of so much importance to the subject of educational research that his conclusions merit great consideration. I venture to suggest that some of his conclusions are not warranted by his own data. In dealing with the subject of individual differences in amount and rate of improvement, Dr. Henmon says that he

believes that his data unmistakably point to the conclusion that individual differences tend to increase rather than to decrease with equal amounts of practice. Referring to his own data, he says that "an inspection of the tables shows that by any rational method of interpretation, the scriptural law 'to him that hath shall be given' holds. Those with the highest initial scores have the highest final scores and gain most both absolutely and relatively." The tables undoubtedly do show this, but I question the method by which they were constructed. This method was to arrange each grade tested into groups (quartile groups for grade iv and tertiles for grades v and vi), on the basis of the final, or May, scores of the pupils of that grade. The scores of the individual pupils were then traced back through the preceding months, the grouping made on the basis of the May scores being retained. According to this method it is found, for all three grades, that the groups which made the best average scores in May made also the best average scores in September. It is also found, and Dr. Henmon believes this to be very significant, that the amount of improvement of the superior groups is greater than is the amount of the improvement of the inferior groups.

It seemed to me, upon reading Dr. Henmon's article, that at least as good a way to group the pupils, would be according to their initial, rather than their final scores, and I wondered if such grouping would yield the same results as he found. To test this out, I have worked over his data, making my grouping on the basis of the September<sup>1</sup> rather than the May scores. My Group I consists of individuals who made up the top quartile (or tertile, for grades v and vi) of the *initial* scores. The average deviation of the scores from the class average has been calculated for each group in the same manner as in the original article. These deviations are given in the accompanying tables. A glance at these tables shows that when the pupils of Dr. Henmon's study are grouped according to their initial score, differences between pupils do not tend to increase with practice. In fact, in the case of all three grades, the *absolute* gain of the group with the lowest initial score was greater than that of the group with the highest initial score. The *relative* gain, of course, is even more in favor of the low group. When the scores are expressed in terms of deviations from the class averages, it is seen that the extreme groups apparently become more, rather than less, alike, from the beginning to the end of the school year.

It is not my intention to claim that these data actually point to a decrease in difference with practice. As Dr. Henmon says, the problem of measuring individual differences in improvement is very complex. Differences in units of measurement, as well as other complications, are quite probably great enough to swamp the small tendency I have here shown to exist (when pupils are grouped according to *initial* ability) towards an increase in "likeness." It is, however, claimed that Dr. Henmon's conclusions are unwarranted, unless he is able to show that his method of grouping is

TABLE I. GROUP DEVIATIONS FROM CLASS AVERAGES. PUPILS GROUPED ON BASIS OF SEPTEMBER SCORE. GRADE IV

	GROUPS			
	I	II	III	IV
September deviations.....	6.0	0.4	-1.8	-4.6
May deviations.....	4.5	-3.5	-0.7	-3.1

TABLE II. GROUP DEVIATIONS FROM CLASS AVERAGES. PUPILS GROUPED ON BASIS OF SEPTEMBER SCORES. GRADE V

	GROUPS		
	I	II	III
September deviations.....	7.3	-1.0	-5.3
May deviations.....	3.8	+1.8	-5.7

<sup>1</sup> The October rather than the September score is used for grade vi, because Dr. Henmon, in his article, omits the September scores of three pupils in this grade. A pupil's score is the sum of the number of examples right on the Courtis Standard Research Tests in Arithmetic, Series B.

TABLE III. GROUP DEVIATIONS FROM CLASS AVERAGES. PUPILS GROUPED ON BASIS OF SEPTEMBER SCORES. GRADE VI

	GROUPS		
	I	II	III
September deviations.....	9.8	-1.0	-8.8
May deviations.....	5.7	6.1	-11.7

a better one than the one which I adopted, for solving this problem. For practical purposes of prognosis it is surely more useful to evaluate pupils according to initial, rather than according to final achievement.

KATHERINE MURDOCK

*Instructor in Psychology, Extension Department,  
Columbia University*

### A Bright Boy

Harold M. F. was born February 24, 1916. He was tested by the writer with the Stanford Revision of the Binet-Simon Tests, April 15, 1920. His age that day was 4-2. His mental age was found to be 7-0. His intelligence quotient, after the manner of Terman, was 168.

The test was made in the office of the superintendent of schools of the small city where Harold lives. The superintendent, the high-school principal, and both of the subject's parents were present and observed the test. There was no indication that the subject was affected by the presence of these four people. There was, however, one distracting influence. On the wall of the office hung a large clock which controlled the ringing of class-period bells in the building. The occasional peculiar noises made by the mechanism of this clock attracted and held his attention. Only after the examiner had given a brief explanation of the clock and its function was he willing to give heed to the tests.

We had heard of the unusual performances of Harold on a previous visit to this city and had no difficulty in arranging through the superintendent of schools for the test. His parents were very much interested in the tests and their outcome and gladly supplied all the information desired concerning the boy's activities and interests.

The examination began with the four-year level. He readily passed all of these tests. He also passed all but the aesthetic comparison test in the five-year group, and all but the mutilated pictures test in the six-year group. He missed the bow knot and diamond tests in the seven-year group, and the comprehension, definitions, and vocabulary tests of the eight-year group; and he passed one, the date test, in the nine-year group. In this last test he gave correctly the day of the week, the month, the day of the month and the year. His parents say that he has at home a perpetual calendar which he adjusts each morning.

Harold has a sectional map of the United States which interests him very much. The map is cut along the state lines, there being but one state to a section except that in the eastern part of the Union two or three small states constitute a section. He places

the sections by first reading the names of the states and then laying each section in approximately the correct position even though that position be, for a moment, isolated. "Take the gentleman on a trip to Texas," suggested his father. Harold replied, "Kentucky, Tennessee, Mississippi, Louisiana, and Houston or Galveston, Texas." (Harold lives in Ohio.) Similar trips to other parts of the country were suggested and correctly "taken."

The boy's keen interest in the facts of place-geography is remarkable. He gave correctly the counties in which the following Ohio cities are located:

Dayton	Portsmouth	Athens
Akron	Zanesville	Marietta
New Lexington	Columbus	Youngstown
Chillicothe	Cleveland	Sandusky
Cincinnati	Newark	Toledo
Springfield	Mt. Sterling	Lisbon

Furthermore he spells the names of these cities and of the counties in which they are located. The counties in order are: Montgomery, Summit, Perry, Ross, Franklin, Cuyahoga, Licking, Madison, Athens, Hamilton, Clark, Scioto, Muskingum, Washington, Mahoning, Erie, Lucas, and Columbiana.

He can name the capitals of all the states and can spell each. The writer had heard of this accomplishment in advance of the test but tried him on a dozen or so, located in all parts of the country. No errors were made.

But Harold's knowledge of city names and locations extends beyond the capitals. With one exception he gave correctly the states in which the following cities are located:

Newark	Tacoma	Cincinnati	San Francisco
Baltimore	Dubuque	Cleveland	Detroit
Erie	Houston	Evansville	Pasadena
Charleston (S. C.)	Oklahoma City	Chicago	Galveston
Louisville	New Haven	Birmingham	Minneapolis
Chattanooga	Pittsburg	Kalamazoo	Milwaukee
Dayton	Savannah	Parkersburg	New Orleans
Akron	Buffalo	Portland (Ore.)	St. Louis
Marietta	Petersburg	Portland (Me.)	Los Angeles
Omaha	Portsmouth	Jacksonville	Colorado Springs

We have copied this list from a slip of paper on which he had previously written them, reproducing them as he prepared them, spelling included. The one failure was Louisville, Kentucky. He cannot write script but prints his words.

The writer has a list of 25 birds which his mother says he readily recognizes when their pictures are encountered. Recently he attended with his parents a meeting of a local club called "The Science Club." A club member read a paper on the subject of birds and used a projection lantern in picturing the common American birds. As the birds came on the screen Harold amused the assembly by loudly announcing their names. This incident is vouched for by the superintendent of schools.

Harold has recently become interested in the names of automobiles. The writer has a list of 23 common cars, arranged alphabetically, which he has evidently copied from an advertisement, which he is learning, including the spelling.

At the age of two years and nine months Harold could tell the time of day. At this time he was presented with a watch which he carried for a number of months, proudly yet seriously informing his associates of the time. As a test we asked him to tell us the

time by the clock which had attracted his attention. He replied, "Eight minutes after ten." This was within 30 seconds of being exactly correct. The precision of his statement is worthy of note. He spells the names of all the days of the week and months of the year and can correctly give the number of days in each month. He also reads the thermometer and has been known to comment on the danger of frost when the thermometer goes below 40.

This unusual boy can read and write numbers to a thousand. We handed him a copy of Terman's *The Measurement of Intelligence* and asked him to turn to page 141 and then to page 267. He readily did so. We have a paper containing a long series of three place numbers which he has written. All are legible and fairly neatly done. Furthermore he writes the Roman numerals to C, as attested by a list of them in our possession.

His interest in mechanical things is shown by the projects which he sets for himself with children's building blocks. He has a large supply of blocks of various sizes out of which he has constructed buildings in imitation of the various state capitols, pictures of which he has seen. At present he is engaged in constructing the rather elaborate front of a large hotel in imitation of the picture which he has on a postal card.

Harold has evidently taught himself to read. His mother, seemingly a very intelligent woman, is unable to tell how he learned. She relates that before he was two years of age his grandfather frequently amused him by reading to him stories from children's books. Soon thereafter his parents found him reading for himself. He read as well as the average pupil at the end of the first year in school from the *Story Hour Book*, *Book One*, one of his own books. We supplied him with a copy of the *Baldwin and Bender First Reader* and also the *Winston First Reader*. He read from each of these at sight as well as from his own *Story Hour Book*. He is in the habit of getting the evening paper when it is delivered and reading to his mother the weather forecast for the following day.

Harold had learned all the letters of the alphabet from alphabet blocks by the time he was 18 months of age. He could name all except W and L, which he was unable to pronounce. But when asked to locate these letters he showed no hesitation in identifying them.

The boy's father is a college graduate, has studied law, has been prominently connected with two banks and has been admitted to the bar. He was a cashier in one of the banks. There seem to be no members of the family, immediate or remote, who have attained eminent distinction. Harold is the only living child in the family, a girl, who seems to have been very intelligent, having died before his birth.

The above incidents have been related to substantiate the findings of the Binet test. Further examples of the unusual performances of this remarkably precocious child might be supplied. All the evidence which the examiner was able to gather suggests that here may be a genius of a rare type.

Of course Harold's unusual performances cannot be attributed to training. Four-year-old children cannot be trained to do what this boy does easily unless they are possessed of an exceptionally high order of intelligence. Furthermore, the parents of this child have tried, unsuccessfully, to discourage him in his studious habits.

Harold is a healthy, vigorous, physically normal boy in every way. With the single exception of Spanish influenza which he had during the recent second epidemic, he has no disease history. He is the kind of boy one would gladly and proudly call one's own.

In the words of Terman, "How impatiently one waits to see the fruit of such a budding genius!"

R. L. MORTON  
*Ohio University*

What are the two questions about your work that you would most like to have answered? Unless you are different from most good teachers, these questions probably are (1) How well are my pupils doing in their work? (2) How well ought they to do? The answers to these two questions give all good teachers grave concern. This concern becomes even greater when it is known that deficiency in certain school work means certain failure. When, for example, you know that unless your pupils have a certain capability in silent reading they will surely fail to complete the elementary school, and when you know that lack of a certain higher minimum ability in silent reading means failure to complete high school, and that lack of a still higher minimum means failure to complete college, then your concern for the progress of your pupils becomes grave indeed.

Measuring the results of your teaching will help you to know how well your pupils are doing; and the use of standards will help you to judge how well they ought to do. Good teachers have always been anxious to measure the results of their teaching. They have tried to do this by the use of examinations. Their success has depended on the kind of examinations that they have used, on the accuracy with which they have marked the questions, and on the use they made of the papers after they are marked. Because you have not always done well in your use of examinations is not necessarily a just cause for blaming you. Physicians did not do very well with fever cases before they had the thermometer, and they did not do well with lung trouble before they had the stethoscope. Before the invention of the X-ray many a person was afflicted from causes that are now promptly located and remedied.

It is probable that your teaching does improve because of your use of examinations. Before the physicians had thermometers they tried as best they could to measure the amount of temperature of a patient by such means as passing the hand over the head, noting breathing, dryness of lips, etc. So you note the daily work of your pupils, grade their papers, and give them examinations. Just as the physician improves his work through such better instruments as the thermometer, so you may improve your work through the use of better examinations. These better examinations are called *standardized* tests and scales.

Just as the physician did not know how much more he might be helping his patient before he had the X-ray, so we as teachers often do not know how much more we might be helping our boys and girls. One point that we shall need to see more clearly, then, is the disadvantage of the teacher-made or principal-made, or even the superintendent-made examination.

The next lesson will take up this point. Before reading the next lesson, write out your best answers to the following.

#### QUESTIONS AND EXERCISES

1. List at least three other instruments for accurate measuring besides the stethoscope and thermometer.

<sup>1</sup> Being the introductory lesson to a first course in Educational Measurements, now offered through correspondence. The title is suggested by that of Professor Mead's article in the September, 1920, number of the *Journal of Educational Research*.



2. What units of measure does the farmer use? The merchant? How are these standardized?

3. State some advantages of the use of standardized instruments for measuring potatoes.

4. What are the disadvantages of what is called barter in the trade of primitive peoples?

5. Fill in the blanks in the following sentences so as to make them state a summary of this lesson.

All good teachers are greatly concerned to know how..... their pupils are.....and how much..... they ought to.....  
..... The best way to know is to..... Until recently the best means of knowing has been the ..... Standardized tests are merely improved..... Just as the instruments which the physician uses for examining his patients are being improved, so the instruments which the teacher uses ought to be.....

C. W. STONE

*State College of Washington*

Within recent years the use of standardized tests in school subjects and the use of tests for determining the intelligence of school children have increased with an astonishing rapidity. The opposition of educators which was prominent in our educational periodicals and at educational meetings has practically disappeared. An educator who has not been converted to their use is an exception. In the midst of such "prosperity" it is, perhaps, wholesome to note what may, possibly, be the attitude of a considerable number of laymen. We quote below at some length an editorial published in the *Peoria Transcript* for September 16, 1920. Presumably, the writer of the editorial is a layman.

#### **A Layman's Attitude Toward Intelligence Tests**

According to plans promulgated by Dr. Walter S. Monroe of the bureau of educational research, University of Illinois, tests to determine the mental capacity of approximately 200,000 public school children of Illinois will be made during the week of October 4.

These tests are sponsored and for the most part devised by Dr. Monroe. Children of the first and second grades, it is announced, will not be examined. Dr. Monroe is quoted as saying that county school superintendents of nearly half the counties of the state have consented to the tests, and that classification and standardization of the children as individuals rather than by groups will be sought. The examination will consist of the three distinct scales; a group intelligence scale, "Monroe's Standardized Silent Reading Tests" and arithmetic tests.

We have no doubt that interesting statistics could be collated [collected] through the examination for mental age of 200,000 school children, but we seriously doubt the authority of county superintendents of schools to consent to the Monroe tests or any other device for determining the individual mental age of school children.

The public school is a constitutional institution created for the sole purpose giving all children of the state "a good common school education." It is supported by public taxation. We know of no authority by which public school children may be subjects for psychological clinics by a department of the state university.

We are living in an age in which the individual is called upon to make many sacrifices for the public good. Psychology is a comparatively new science and its devotees are fired with a fanatical zeal to broaden its boundaries. We are not prepared to say that the Monroe tests should be barred from the public schools, but certain it is that parents are under no legal or other obligation to submit to them.

It should be made clear in every county whose consent is given by its superintendent of schools that compliance is voluntary and that any public school pupil may be excused from the tests upon individual or parental request.

One erroneous statement in the above editorial should be pointed out. The testing program to which he referred was not initiated by the Bureau of Educational Research of the University of Illinois, but was initiated by the county superintendents, and the Bureau of Educational Research has acted only in an advisory capacity.

Dr. Leonard P. Ayres, a director of the Russell Sage Foundation of this city, has been elected Vice-President of the Cleveland Trust Company of Cleveland, Ohio, and will take up his new work at once. Since the establishment of the Russell Sage Foundation in 1907 Dr. Ayres has been the Director of its Department of Education, and also of its Department of Statistics. The work of the Foundation in these two fields has attracted wide attention. Dr. Ayres is the author of a number of books on educational, statistical, and scientific subjects.

**Dr. L. P. Ayres Leaves the Russell Sage Foundation to Enter the Cleveland Trust Company**

During the war he organized and directed simultaneously the statistical offices of the Council of National Defense, the War Industries Board, the Priorities Committee, and the Allied Purchasing Commission. He then entered the army and became its Chief Statistical Officer, and organized the Statistics Branch of the General Staff. He was commissioned as a Colonel, and established the statistical services at General Pershing's headquarters in France, as well as those of the Supply Service of the Expeditionary Forces. After the armistice he was appointed Chief Statistical Officer of the American Commission to Negotiate Peace, and accompanied President Wilson on his mission to France. For these services he was awarded the Distinguished Service Medal.

Dr. Ayres is a graduate of Boston University and took his postgraduate work at Columbia University. His educational writings deal largely with administrative and financial problems. Some years ago he made an analysis of large numbers of letters, newspapers, and other sorts of English composition, to identify the 1000 commonest words in English writing. The results of this research largely revolutionized the teaching of spelling in the public schools. In cooperation with his associates in the Russell Sage Foundation Dr. Ayres has conducted a large number of surveys of city school systems. Among his recent publications, his comparative study of state school systems and his book entitled, "The War with Germany," have attracted wide attention. Dr. Ayres will take charge of the research and statistical work of the Cleveland Trust Company.

# National Association of Directors of Educational Research

(E. J. ASHBAUGH, *Secretary and Editor*)

I recently attended a meeting of school men at which a gentleman who had evidently spent some time in the study of the measurement of mentality dwelt at some length on the individual differences in the mentality of children and the possibility of discovering these differences by the use of general intelligence tests. He portrayed vividly the wide ranges of capacity found in the ordinary class of school children and the consequent fact of difficulty in teaching them as a single group. His major emphasis, however, was upon the superintendent's responsibility for the discovery of the mental capacity of the individual children within his school system.

When the meeting was over, the superintendents and principals in discussing the address seemed to generally arrive at one conclusion, voiced by one of their number when he said, "Perhaps any of us could discover the mental capacities of our children, but the more difficult and vastly more important problem is, what shall we do for them after they have been discovered. On that point he gave us no help."

This experience has doubtless been duplicated by many of the readers of this column. It raised a question in my mind, however, from which I shall have no rest until I pass it on to you, especially to you who are members of our research association. One of the privileges bestowed upon the secretary in return for his annoyance in endeavoring (often without avail) to get you to report your activities, is that of being able at pleasure to put to you the questions which bother him.

A number of you have been using the group tests for measurement of intelligence. Some of you have been reclassifying pupils on the basis of these tests; placing some in slow classes, some in fast groups, some in unclassified groups, etc. But what modification of the course of study have you made? What evidence have you that the new material which you have assigned them is better fitted to their capacities than the old? What reason have you to think that they may now, working at their own highest level of achievement, succeed and therefore be progressing and happy?

But another question further. What have you done as an individual; what has the association as a whole done; what has anyone done to enable the superintendent or teacher in a small school system, a system of 200 to 500 children in all twelve grades, to care better for the children after having discovered their capacities? Does the problem challenge your careful thought? Or does it appear unimportant to you as you face your problems in your own field?

Will you write your reactions to these questions to your secretary for publication in these columns?

But two communications from members have reached my desk during the past sixty days. They are as follows:

Miss Henrietta V. Race, recently of the Louisville schools, has accepted the position of Director of Mental Measurement in the Kansas City Schools. Miss Race while in Louisville established a psychological laboratory in 1914. During the intervening six years, she made two surveys of the city schools in reading, arithmetic, and language, and did some work in penmanship.

She examined 4,000 boys and girls in the white high school in reasoning tests in history and the freshman classes of the white and colored schools in language, arithmetic, spelling, and composition. She also gave the Army test to these freshmen.

In 1916 she organized one of the first classes, if not the first class for gifted children, in the United States, the class being organized on the basis of mental tests. Two other similar classes were organized later.

She faces the problem at Kansas City of mental measurement for complete classification.

The other communication was from Charles D. Dawson, assistant superintendent of schools in charge of educational tests and measurements. He states that his bureau is engaged in the following work:

1. Measuring of locational geography work by means of Courtis' test.
2. Applying group psychological tests to grades in several schools.
3. Using the Binet-Simon mental tests in individual cases.

We are glad to welcome as new members of our association the following:

Mr. D. Edgar Rice, Consultant, Division of Tests and Standards, Camp Grant, Illinois.

Dr. Herschel T. Manuel, Colorado State Normal School, Gunnison, Colorado.

Mr. James L. McCrory, Assistant Superintendent in Charge of Administrative Research, Omaha, Nebraska.

Mr. Edward McMillan, Research Examiner, Central High School, Omaha, Nebraska.





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